THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXII. CLEVELAND, O., JANUARY 31, 1889. NUMBER 5.

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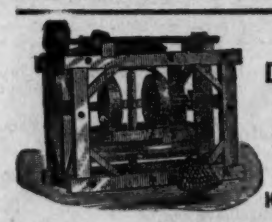

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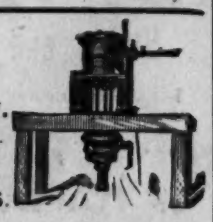

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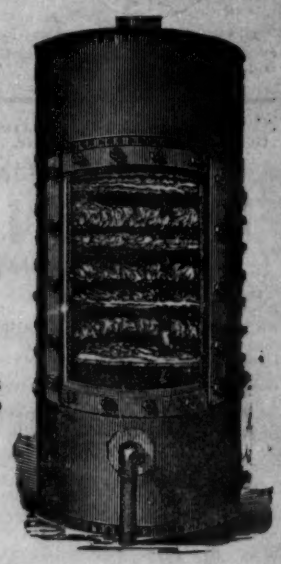

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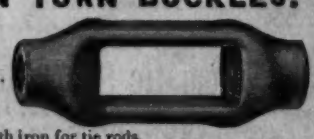

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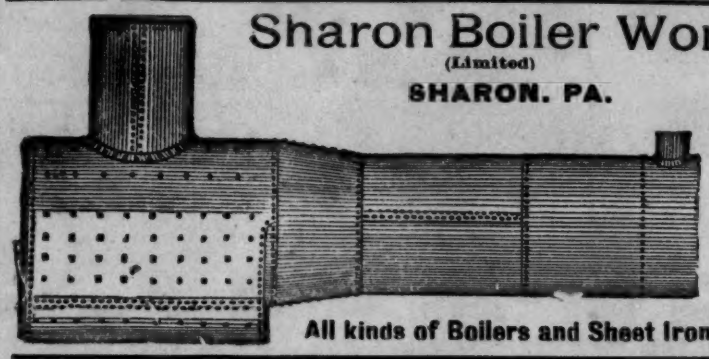

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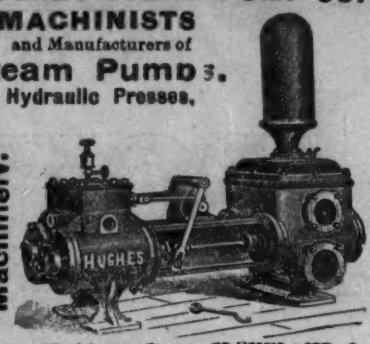

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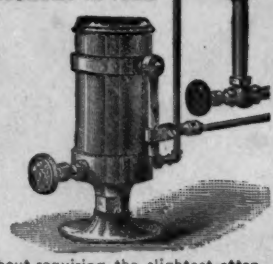

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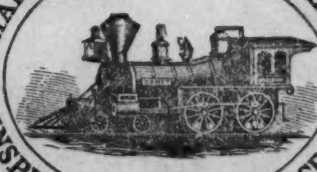

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COMPOUND LOCOMOTIVES.

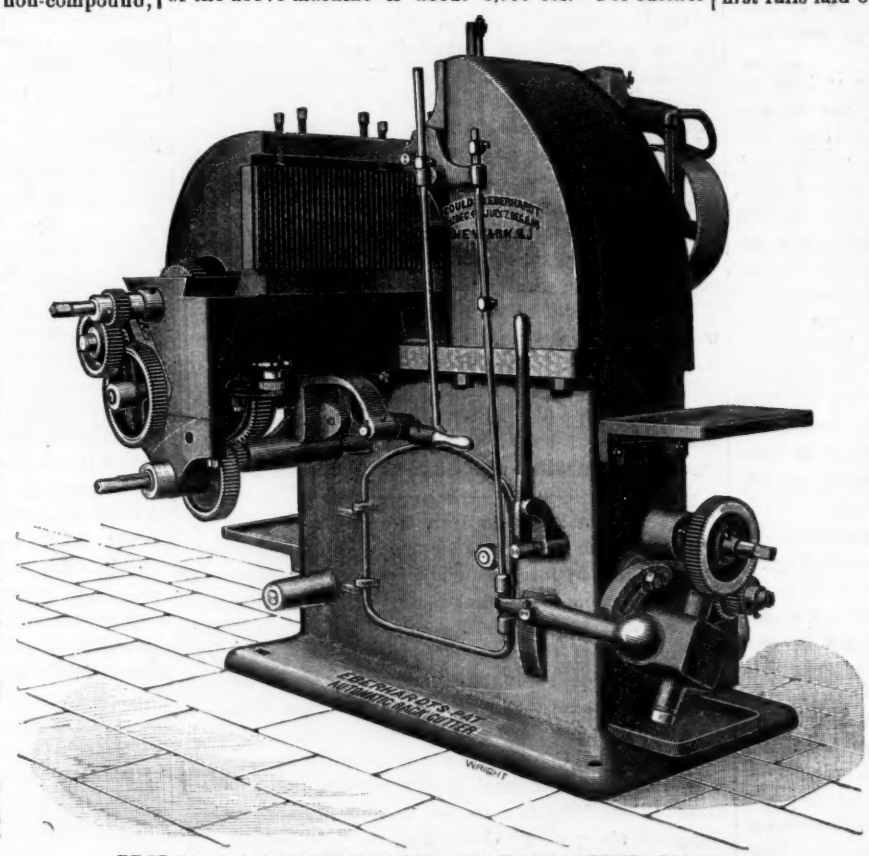
The Webb compound locomotive for the Pennsylvania will soon be running in service. It is in all respects exactly like the compounds used on the London & Northwestern for hauling their principal express trains. The tender is not of the regular London & Northwestern pattern but is very similar and is fairly representative of ordinary English practice. The application of the compound principal to locomotives has been much discussed in England, and and the opponents of the system have mainly urged three reasons against compounding locomotive: 1, that English locomotives have already attained the lowest possible limit of coal consumption per unit of work performed; 2, that the compound principal is inapplicable to non-condensing engines; and 3, that it is likewise inapplicable to engines working at varying speeds and under widely different grades of expansion. The advocates of compounding reply, as regardes the first argument, that in nearly all cases compound engines have shown a considerable economy over locomotives of similar pattern but non-compound, when both have worked under similar conditions, and that even the opponents of compounding cannot quote a case in which the compound has burnt more fuel than the ordinary engine when tried on the same service.

As regards the second argument it is pointed out that the majority of portable engines above 10 nominal horsepower are now made compound, though non-condensing, and that the range of pressure in a compound locomotive is greater than in the majority of compound condensing marine engines now running. For instance, a compound locomotive with only 160 lbs. boiler pressure, has a range of 155 lbs., allowing 5 lbs. back pressure, while a modern steamship like the Alaska has a range of only 112 lbs., allowing nearly 3 lbs. back pressure, the boiler pressure being 100 lbs. Now, it is admitted that above this pressure a triple expansion engine gives the best results, the range of pressure being too great for an ordinar compound. Hence the range of pressure in a locomotive should be ample fo compounding.

As regards the third reason agains compounding locomotives, the advocate of the system must admit that practical difficulties exist, but contends that any loss from over-expansion when the engine is running under quite a high degree of expansion on the level or on the down grade, and is more than counterbalanced by the great saving affected when the locomotive is working hard, toiling up a grade or starting a heavy train. An ordinary locomotive is then working with three-fold expansion when exerting the same tractive force. The compound locomotive cuts off late in the stroke in the high pressure cylinder, but the steam expands in the low pressure cylinder, and, as generally proportioned, the total expansion is never much less than three-fold. It is urged, and with reason, that while the difference between five-fold expansion in the ordinary locomotive and seven or eight-fold in the compound, does not materially affect the consumption of coal, the difference between cutting off at the end of the stroke and expanding three-fold is enormous, and that it is when exerting full power that the economy of the compound locomotive is manifest. Doubtless the present styles of compound locomotives are susceptible of improvement. The proper proportion of the cylinder valves and valve gear are all diffi ult problems which experience and ingenuity alone can solve, and help to make the success of the compound locomotive as undoubted as that of the compound marine engine.—[Gazette.

EBERHARDT'S ENTIRELY AUTOMATIC RACK-CUTTING MACHINE.

To meet the advanced demand of the times, this machine has recently been brought out, and the accompanying cut, taken from a photograph, accurately represents the Eberhardt Entirely Automatic Rack-Cutter, for cutting racks in all kinds of metal and of all pitches. The capacity of this machine is 8″ face by 36″ long, in one setting, and cutting at a rate of about 50 ft. per 10 hours in steel. It will cut either circular or diametrical pitches; the feed can be altered to suit any pitch or metal that all the best cutters will stand, for the several parts are very strong, and nothing has been spared to make this even superior to their well-known Automatic Gear-Cutter, now in use all over the world. The weight of the above machine is about 5,000 lbs. For further information address E. Gould & Eberhardt, 97-111 N. J. R. R. Avenue, Newark, N. J.



EBERHARDT'S ENTIRELY AUTOMATIC RACK-CUTTING MACHINE.

Quadruple Engines.

Messrs. Denny & Co., of Dumbarton, Scotland, have just completed some quadruple expansion engines for a company which is located at Buenos Ayres, to be fitted in a steamer bearing the same name. The cylinders are 32 in., 46½ in., 64½ in., and 92 in. diameter, and the initial pressure 180 pounds to an inch. It is hard to foresee where the high expansion system is to end. We are now fast approaching wild dreams of Mr. Perkins, who a quarter of a century ago proposed much the same thing. We well mind how a well-known English engineer, at Manchester, was ridiculed only ten years ago for proposing a quadruple expansion engine. Now they are constructed in San Francisco without causing more than passing remark.—[Industry.

For the next 111 years the figure 9 will appear in the date line of every letter that is written.

MONSTER STEEL RAILS.

Philadelphia Record.

The ninety-pound steel rails which the Philadelphia and Reading Railroad has laid on portions of its Bound Brook route are probably the heaviest in use within the United States. They are necessitated by the steadily increasing weight of engines and the development of speed which mark the times we live in.

"Accompanying the development of the railroad in this country," said Chief Engineer Nichols, of the Reading Road, yesterday, "there has been a steady development of the rail. In the early days of railroading the trains ran on a thin band of iron, which was fastened to a strip of timber. Out of this grew one of the early forms of railroad accident. The rail 'snaked' up, as it was called, that is, the end sprung up from the wooden support, and as a train came along it was caught by the wheel and forced through the bottom of the car, often impaling passengers. Then the rail assumed its present general form, but was much lighter than now. The first rails laid on our main line to Reading in the thirties weighed only forty-five pounds to the yard. The weight has gradually increased until, in the development of the railroad system, steel rails came into use. The first steel rails that we laid was on the Mahanoy Branch, and weighed about fifty-six pounds to the yard. From that time on we have been putting in use rails more and more massive—sixty, sixty-four, and seventy pounds, and now finally the Bethlehem Iron Works have furnished us with a ninety-pound rail. These rails have been laid where the travel is heaviest. At some points along the road where the line is tolerably straight our trains frequently go at a speed of seventy-five miles an hour. There is tremendous wear and tear when the modern American engine goes at this rate, and hence the need of a rail that will yield just as little as possible."

Said another official: "The ninety-pound rail is by no means the heaviest in the world. In Canada, I understand, trial is being made of 100-pound rails. Better still, on some of the English roads a 120-pound rail is not unknown. The need of heavy rails is greater in England than in this country for one reason at least. There railroads are straighter than here and greater speed can be attained and heavy wear and tear result." Inquiry at the Pennsylvania Railroad office showed that the heaviest rail in use on that line weighs eighty-five pounds to the yard. It is considered very heavy and is placed at points where particularly fast time is made. The average weight of rails used is about seventy pounds, which is the average weight on the Reading Road as well.

Wood Petrified by Artificial Means.

A Swedish scientist claims to have discovered the secret of petrifying wood by artificial processes. He thinks it will be possible ere long to construct edifices of wood and convert them into stone. As it takes three months and costs about £500 to petrify a block of wood of the dimensions of a cubic inch, it will probably be some time before his process will be generally adopted. —[Saw-Mill Gazette.

Natural gas has been reported found at Racine Wisconsin, and at Fort Smith, Arkansas.

DOES IRON PERISH IN THE USING?

M. D. D. in Carriage Journal.

In the November issue of the *Blacksmith and Wheelwright* there is an article copied from the Boston *Journal of Commerce*, entitled an "An Unsolved Mystery." As I will proceed to show, there is no mystery to solve. So far from iron "being unlike wood and other materials which perish in the using," I have known it to perish with more celerity than wood and some other substances. Iron most assuredly does "perish in the using of it," as every blacksmith knows but too well. I have seen horseshoes that were worn as smooth and thin as an old Spanish quarter of a dollar, and frequently I have seen tires on carriages and wagons that were worn almost as thin as were the shoes.

But the wear and tear of iron is not the only thing which causes it to perish and disappear. In my opinion, rust is an equally potent factor in its destruction. All iron structures or articles that are exposed to the weather, if not well painted or covered by some composition to keep them from rusting, will decay and deteriorate almost as soon as wood or other material. We read in the Bible and ancient history, that iron was known, worked and used thousands of years ago, and it is said the slag from the iron furnaces of the ancient Egyptians has lately been discovered, and that it is so rich in metal that it will pay to work it over again. This much do we know, yet there is no well authenticated instance of any article made of iron in those times that have survived to this day. If iron does not perish in the using where are they? for it is well known there are thousands of things made from gold, silver, and other metals by the ancients that are in existence now.

Further on in this article I am criticising I note this sentence: "Iron, when it has served its purpose in one position, goes to the foundry or forge, as scrap iron with very little loss. Old castings are recast in some new forms, and are not inferior to castings made from new pig iron."

We all know that both wrought and cast iron are worked up again into new forms. But iron workers know that they are not, as a rule, so good as if they had been made from new iron, and instead of "little loss" there is much every time the metal is worked over. And that is not the only loss, for every time the iron goes into the furnace it loses some of its quality, so much that it is always customary to put new iron with the old to keep up its quality. I have worked with tuyers that were cast from old iron, and that burned out in the heat of the forge as readily as a soft burnt brick. By frequent remelting all the virtues of the iron had been burned out. This fact is well known to stove molders, and consequently they do not cast their stoves from old iron, for if they did so the stoves, and especially those parts exposed to the direct heat of the fire, would burn away immediately.

Some years ago there was a large collection of old horseshoes in my shop, and I wanted the space they occupied for something else, but did not wish to throw them into the scrap pile, so I put them into one corner of my shop yard. By some means they got covered with rubbish and dust, and as the old saying goes, "out of sight out of mind." I forgot all about them. Two or three, or it may be four years after, I was cleaning up the yard and came upon the old horseshoes, and it was a work of some difficulty to separate them. The shoes were then half rusted away, and doubtless if they had remained there three years longer, they would have entirely disappeared as iron, leaving nothing but a mass of rust.

If great care and pains are not taken to preserve iron, it will perish whether you use it or not, and the smaller the article, and the poorer the quality of the metal, the sooner it will disappear. There are few metals with which I am acquainted that will rust, corrode, burn up in the forge or furnace and disappear so easily as iron does.

Here is a case in point, which many, if not all, smiths can confirm from their own experience. A man brings a job to a smith, it may be some farm machinery, and the smith looks the work over, and selects a piece of iron and puts it into the fire. The man who brings the work undertakes to hasten it by blowing the bellows and striking for the smith. Before the iron gets red hot it may be that another man brings some more work, and the smith steps out of the shop to see what is wanted. Thus for a few moments he loses thought of the other job, and when he enters the shop he finds that his iron is gone. It has been burned away in the forge fire. But suppose that nothing of the kind happens, and the smith after working one or two hours finishes his work; if he has to return the iron to the fire many times, or to take high heats, when the work is done it will be found that the job does not weigh more than two-thirds of the amount it weighed when it was put into the fire. The other third is lost or has ceased to exist as iron.

At the close of the article to which I am referring there is the following paragraph:

"Now when we observe the millions of tons of pig iron fresh from the ore that are added to the stock in hand every year, the mystery is that the demand remains unsupplied. The constantly increasing use of iron in all its forms, would account for the increased output from the furnaces every year, if like other materials it perished with the first use; but as it returns to the common stock as new material, why is the demand still maintained?"

As I have already shown, the scrap iron returned to the furnaces and forges does not more, than if as much as make good the wear, tear, and decay of iron every year and but for the large output of new iron we should soon find ourselves without any. Undoubtedly "the constantly increasing use of iron does account for the increased output every year," nevertheless the supply does sometimes out-run the demand, and at such times the furnaces have to shut down. The demand and supply of iron have been very much greater for the last sixty years than in any other corresponding time in the world's history, and all indications point to its being still larger in the future.

A Big Wheel.

A Scranton, Pa., dispatch says: The largest wheel of the kind ever made in this country, and probably the largest of any kind, is now in course of construction at the machine shop of the Dickson Manufacturing Co., on Penn avenue. It is what is called a sand wheel, and it is being made for the Calumet and Hecla Copper Co., of the Lake Superior region. The great wheel will be 53 feet in diameter and several feet wide, and the Dickson Manufacturing Co. will get $70,000 for it. It is being built around a 20-inch hollow shaft of gun-metal, and it will weigh between 150 and 160 tons when completed. When the great wheel is put in place at the copper mines, it will be made to revolve slowly by means of enormous cogs on the surface of its circumference. These cogs are being cast in segments, and will weigh many tons in the aggregate. On each side of the mammoth wheel there will be fifty buckets, each of which will hold about 100 gallons, and these buckets will elevate the washings and dump them into a sluiceway. After the great wheel has been built up and all the finishing touches have been put on, it will be taken apart and shipped. Every piece will be numbered, so that there will be no trouble in putting the wheel together, and it will take eight or ten cars to transport it.

Export Duty on Iron Ore in Sweden.

A movement is on foot among Swedish iron manufacturers for obtaining a duty on iron ore exported from Sweden, a proposal no doubt aimed at the operations of the Swedish-Norwegian Railway Company, it being maintained that the present enormous export of iron ore and subsequent manufacture in other countries will lessen the demand for Swedish iron. However, such a duty would have the effect of crushing the iron ore export duty of Central Sweden, which is now hardly able to hold its own against foreign competitors. At present about 100,000 tons per annum are exported to Germany *via* port of Oxelosund, on the Baltic, at a price of 7s. 6d. per ton f. o. b., which leaves a profit of about 9d. per ton. This profit would be absorbed by a duty. This ore contains so much phosphorus that it is unsuitable for making charcoal iron, and would therefore be of little value in Sweden.—[Iron.

An Iron Celebration.

Mr. Oliver Williams, the President of the Catasauqua Manufacturing Co., has written a communication to the Catasauqua (Pa.) *Dispatch*, of Saturday last, in which he strongly urges the holding of a semi-centennial in the Lehigh Valley on July 4, 1890, to celebrate the first successful cast of pig iron ever made in that valley with anthracite coal as fuel. Mr. Williams pays a high complimate to David Thomas, who was induced to come to this country from Wales in 1839 by the Lehigh Coal & Navigation Co., for the purpose of utilizing anthracite coal as a fuel for smelting the then almost valueless iron ores of the Lehigh country. Mr. Thomas's success, on 4th of July, 1840, is well-known throughout the metallurgical world, and it is but right that his memory should be honored and the event commemorated.

CLEVELAND'S HARBOR OF REFUGE.

To the Editor of the IRON TRADE REVIEW:

As the people and the daily papers are again becoming excited over the opening of the "Old River Bed" into the Harbor of Refuge, I will venture to reiterate a few of my former ideas upon that subject. The changes in the plans of the construction of a Harbor of Refuge at this point have rendered the opening of the old river bed less objectionable than formerly, and with an opening into the Harbor of Refuge, through the shore arm of the present Breakwater, quite desirable.

But whatever else may happen in the change of currents, very little of the sand and mud brought down by the river will escape from its bed or the bed of the Harbor of Refuge into the lake beyond, and this, sooner or later, will have to be dredged out. With a little forethought on the part of the powers that be, this deposit may be made to pay all it costs to remove it. The general Government may justly be asked to construct the opening through the west arm of the Breakwater, and this would require the construction of outside piers to the extent of 100 feet or more, to prevent cross currents in entering. This is all the general Government can properly be asked to do.

Now, let us inquire how the cost of opening out the old river bed shall be paid. From the railroad right of way which is, or was, at least, the shore line of the lake, to the line of twelve or fourteen feet water in the Harbor of Refuge is something like twelve hundred feet. Through this, and both sides of a channel, say 200 feet wide, piers or wharves will have to be built and maintained. There may be some difference of opinion as to who owns this space. The weight of opinion is that the city owns it, subject to the right and obligation of Congress to maintain the navigation of the lake unimpaired. By an enabling act of the Legislature and the permission of Congress the city may construct these piers, and if the city owns the adjoining space it may lease them with the space for a rental that would more than pay the interest on their cost and their maintenace. Or if the space belongs to adjoining landowners, the city may tax them for the cost of the piers. From the old river bed to the shore line of the lake the city may establish the dock lines as they do those of the river and old river bed and assess the cost of excavation upon the adjoining property, at least as much of it as they do upon the cost of river. The railroad, as an adjoining owner, would have to construct the channel through their 100 feet of this distance. The space between the shore line and the line of fourteen-foot water in the Harbor of Refuge is of little or no value in its present condition, but filled up and occupied with ore and coal docks and manufacturing and commercial establishments, would be of far greater value than the cost of the whole improvement. This, Mr. Editor, is a brief re-statement of a paper read before the Society of Civil Engineers of Cleveland several years ago, entitled: "Our Lake Front and its Possibilities." It is a subject that will never grow old until accomplished. When it is accomplished it will place Cleveland in the very front rank of manufacturing centers. This reclaimed land will amount to not less than one hundred acres. At the meeting place of ore and coal, of navigation and rail communication, and the same system may be carried east and west to an almost unlimited extent. The dredgings from the harbor may be dropped in this reclaimable space and be worth more than all it may cost to remove it and keep it from being dropped in the lake to form bars to the great damage of navigation.

J. H. SARGENT.

Machine for Riveting Stove Pipe.

A recent invention is a machine for riveting stove pipe. In the old way each of the six or nine rivets in a piece of pipe was drawn and driven separately. By the use of this riveting machine all the rivets are drawn by one drop of the hammer, and all of them are set by one drop of the hammer. One man with this machine can turn out from 600 to 1,000 joints of pipe per day. The pipe is formed on a cylinder connected with the riveting machine, and this makes it uniform in size and leaves the lap smooth and free from buckles. There is, we believe, no machine of this description in the market, and it is said the invention will mark a new era in the manufacture of stove pipe. It is easily operated, there is no complicated machinery about it, and it does the work perfectly.

A BILL that passed the Ohio House of Representatives last week prevents the employment of free labor in the penitentiary.

ELECTRIC WELDING OF METALS.

Our illustrations this month show one of the most remarkable results arising from the recent development in and application of electricity. Its influence upon the working of metals will be so great that it is difficult at the present time to comprehend it. We refer to the electric welding of metals by the process invented by Prof. Elihu Thomson, of the Thomson-Houston Electric Company.

Hitherto welding has been confined to wrought iron and steel, and the most perfect welds had only about seventy-five per cent. at their best of the strength of the solid bar. Other metals than these could not be welded by any means whatever. The process of welding iron by the blacksmith is at best crude and imperfect.

Now all this seems destined to be suddenly changed in all industrial works. Not only is iron perfectly welded in a very short period of time, but all kinds of metals can be welded with equal facility not only to each other but to any other kind of metal. Moreover the line of junction of the welded pieces—in the case of iron at least—is stronger for an equal sectional area than the original bar, this being due apparently to the fact that the fusion of the metal by the electric current eliminates the cinder present in all wrought iron bars, so that the line of junction of the welded surfaces is more homogeneous and consequently stronger than the original sectionof the bar.

The principle involved in this new art is that of causing currents of electricity to pass through the abutting ends of the pieces of metal which are to be welded, thereby generating heat at the point of contact, which also becomes the point of greatest resistance, while at the same time mechanical pressure is applied to force the parts together. As the currents heat the metals at their point of junction to the welding temperature, the pressure follows up the softening surface until a complete union or weld is effected, and as the heat is first developed in the interior of the parts that are to be welded, the interior of the joint is as efficiently united as the visible exterior. This is the weak point about an ordinary weld, as may be seen by reference to the accompanying figures. Figure 1 shows full size a piece of half-inch iron welded by electricity,the electrotype being made directly from the specimen, which was filed down to the center line to obtain a section through the center, and then etched with acid, the engraver's services not being brought into requisition at all. The difference between the character of the weld and that done at the ordinary forge is well shown by comparing Fig. 1 with Figs. 3, 4, 5, and 6, which show ordinary welds, the electrotypes being made in the same manner as in the case of Fig. 1, and first appeared in the *Locomotive* in April, 1884, the object being at that time to show the imperfections of the ordinary weld, 5 and 6 showing the result when the attempt was made to weld iron and steel together. We regret that we have no specimen of iron and steel electrically welded, but the welds of dissimilar metals by the electrical process are, we are in formed, just as perfect as between two pieces of iron.

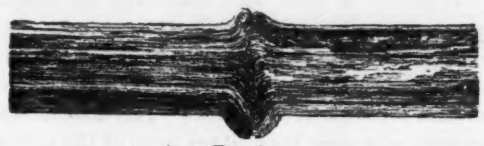


Fig. 1.

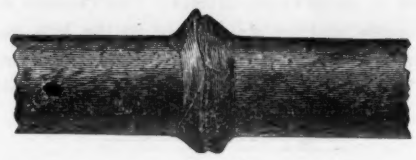
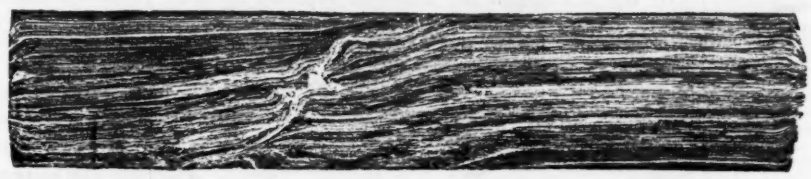


Fig. 2.



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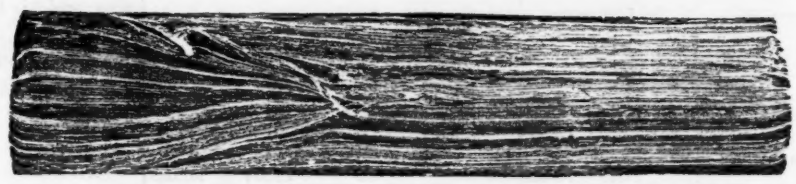

Fig 4.

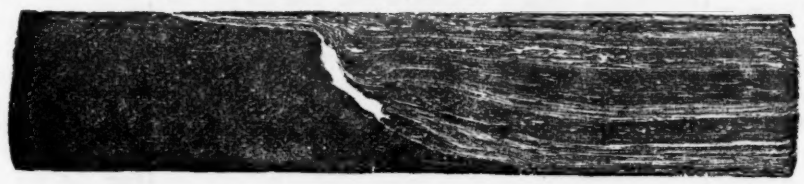

Fig. 5.

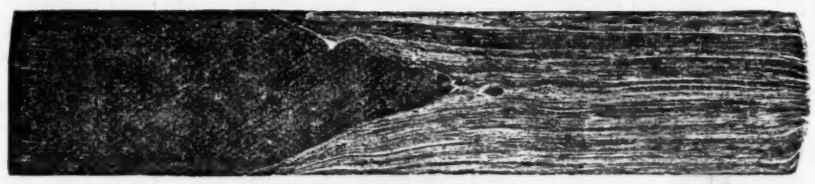

Fig. 6.

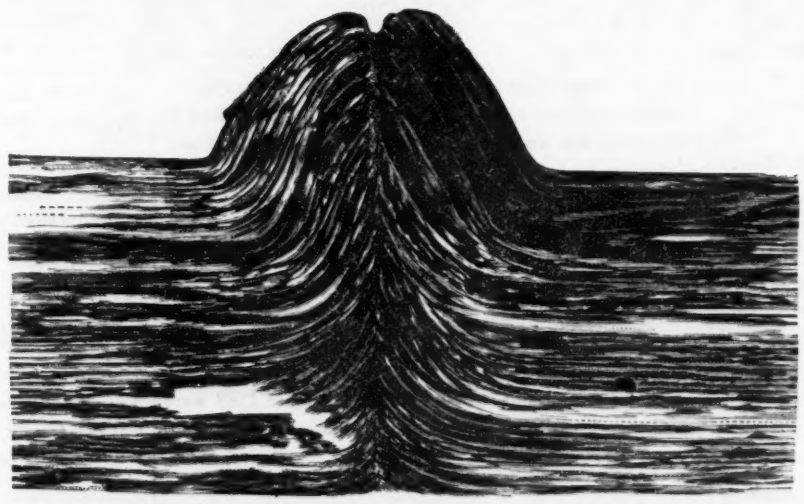

Fig. 7.

Fig. 2 shows the external appearance of the electrically welded bar; it shows the upsetting of the ends of the bars as they are brought together. Removing this projecting portion with a file, or in the lathe, so that the bar has a uniform diameter, and pulling apart in the testing machine, the break nearly always takes place outside of the weld.

The machines built by the Thomson Electric Welding Company are generators of electricity so constructed as to produce in the most economical manner the low-pressure currents needed to do the work. They are of sizes and types suited to the kind of work to be done. They are built to be driven by a belt in shops where there is no dynamo used; where a dynamo is used for any purpose whatever its current can be used for welding by utilizing it in a properly designed machine of what is called the indirect type.

The amount of power required to do this welding is used for so short a time that its cost is really nothing, a few seconds only being required to weld the largest bars. Twenty horse power is the amount actually consumed in welding a half-inch bar, as shown in our cuts, the actual time consumed in welding being not over three or four seconds, as was witnessed by the writer recently.

In Fig. 7 an attempt was made to show on an enlarged scale the section in Fig. 1. This is a difficult matter to do; but under a power of about 40 to 50 diameters on a compound microscope, the denser and more homogeneous structure of the iron through the line of the weld is beautifully shown. With an ordinary weld the microscope is not as a rule needed to show actual separation of the surfaces supposed to be welded. The above cuts appeared in a recent issue of the *Locomotive*, published at Hartford, Ct.

DANGER OF FIRE FROM IRON STEAM PIPES.

The *Sanitary News* advances what is to us not only a new, but a very rational explanation of the *modus operandi* by which wood work in contact with heated steam pipes may become ignited. The fact has been vouched for repeatedly on most trustworthy authority, but while we have been obliged to accept the facts as reported, we have never been satisfied that the explanation given was the correct one. The explanation offered by our contemporary throws new light on the subject, and offers a rational explanation for what to us has heretofore been an inexplicable phenomenon. We quote as follows:

The nature of the fire danger of all heating apparatus where flues or pipes are laid through or near woodwork seems to be misapprehended by many who might be supposed to be well informed on such a subject. One editorial writer addressing an audience of artisans compares the methods by which wood is set on fire by steam or hot water pipes or hot air flues to "the drip of water falling always upon the same place," gradually wearing the hardest rock. "Thus," he adds "a comparatively low degree of heat acting for years upon wood is able to first char, and then under certain external influence, to set aglow, and in flames." If his premise that "the temperature to which pipes and flues are raised is never high enough to set wood afire" is true—and it doubtless is not far away from verity—then the steadiness of the dripping would insure safety, no matter how long continued. Now, the manner in which a temperature too low to start rapid combustion in wood operates in originating a fire is by first reducing the oxide of iron (rust) to a metalic condition. This is possible only under certain external conditions, among them a dry atmosphere. Just as soon as the air is recharged with moisture, the reduced iron is liable to regain, at a bound, its lost oxygen, and in doing so become red hot. That is the heat that sets the already tindered wood or paper ablaze. Where there is no rust there is no danger from fire with a less than scorching temperature in the pipe or flue. Hence the necessity of keeping steam or hot water fittings in good order.—[Unknown Ex.

Does Cold Makes Steel Brittle?

Styffe, Fairbairn, Kirkaldy, Webster, the United States Government Commission, the railroad commissioners of Massachusetts, and others, all hold that the effect of low temperature upon iron is very slight, and that it does not tend to produce a brittle condition.

Sanberg is the only one who clims that a low temperature have any pronounced effect in producing brittleness, that is, he is the only one among recognized authorities, but if you have ever been out in the woods on a cold, frosty morning, you may have noticed that the axe man warms his axe before beginning work; ask him why he does so, he will reply, "To take the frost out."

Watch the trackman on a cold morning; he is very careful not to strike his cold chisel too hard, and neither does he cut so deeply into the rail, before dropping it to break it, as he does in warm weather; ask him why, he will say, "the chisel and rail are full of frost, and will break more easily than in warm weather."

The same thing will be noticed with the men who are unloading steel rails, or wheels and axles. They are more careful to let them down easily in cold than they are in warm weather.

You may say, "But that is only a popular fallacy." It may be so, but those men have had some experience which has led them to this opinion, and I am afraid there is more truth than fallacy in their claim "that frost in the iron makes it brittle."—[Ramsay on "Effect of Cold on Metals."

EMPLOYES of a Hamilton (O.) tool works contributed $53 in one day for a fellow-worker who had been sick.

THE
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CLEVELAND, O., JANUARY 31, 1889.

THE LATEST MOVEMENT IN PIG IRON CIRCLES.

The IRON TRADE REVIEW'S special dispatch from President Hull, last week, very fully covered the nature and scope of the recently organized American Pig Iron Storage Warrant Company. We now have the opportunity of publishing the list of officers, as follows:

Directors—George H. Hull, President; George F. Tyler, Vice-President; Logan C. Murray, Treasurer; W. P. Thompson, New York; William Libbey, New York; John H. Inman, New York; Eckstein Norton, New York; J. D. Probst, New York; H. O. Armour, New York; Thomas Rutter, New York; Morton McMichael, Philadelphia; John C. Bullitt, Philadelphia; George T. Barns, Philadelphia; Samuel R. Shipley, Philadelphia; Enoch Ensley, Memphis.

Executive Committee—William Libbey, Chairman; Thomas Rutter, Logan C. Murray, George F. Tyler, George T. Barns, Samuel R. Shipley, George H. Hull.

Counsel—Alexander & Green, New York; Bullitt & Dickson, Philadelphia.

As heretofore stated, the capital stock is $1,500,000. The headquarters are at No. 52 Exchange Place, New York, and branches are to be established in various cities. One has already been started at Philadelphia. None of the trade papers yet at hand seem to have heard of the movement, but the Philadelphia *Record* has this to say of it:

One of the objects of the new corporation is to develop the iron industry of the South, and the method was explained last night by one who has made a careful study of the question. "When traveling through Georgia and Alabama recently," he said, "I found that the iron men were badly in need of money. Very many spent all their capital in plant and mines, and the result is that they must sell their iron at once in order to carry on the business. No matter what the state of the market, the iron must be sold, and often at a great disadvantage. To relieve the situation manufacturers were then discussing the formation of a company which should certificate their iron, and so make it available for money. It is this same plan which I now understand has taken shape."

Inquiry was made yesterday among a number of iron men of the city to secure their views on the new plan. Said one: "I don't believe in it. The result of making ready money very available in the business will be to flood the market with pig. All this will have to be sold some time or other, and demoralization will result in the trade."

Another prominent iron broker remarked: "This is going to bring a speculative element into the business which will not be beneficial. I doubt very much whether the large manufacturers will touch it."

The general view, as far as could be learned, was not favorable. It is understood, however, that the interests of the South are held particularly in view, and it is largely Southern manufacturers who are pushing the scheme. It was at one time proposed that several Southern railroads should take up the business of advancing certificates on iron in order to help along Southern industry. This was deemed impracticable, and the plan adopted of organizing a company whose sole powers should be to issue storage warrants.

The Pennsylvania Warehousing Company of this city, in answer to the needs of the South, has recently been entering the field and loaning money on iron. It has now storage places in Alabama where pig is received and money advanced directly on it at something above the bank rate. It is said that the plan is to extend this business very largely. The Pig Iron Storage Warrant Company will, however, if the necessary capital is paid in, go into the field and to an extent take the place of the Warehousing Company.

As may readily be inferred, the object of the system is to loan money on iron. It is essentially the Connal storage system, so long in vogue in Great Britain. At last reports there were over 1,000,000 tons of pig iron in these stores, and much more besides in others organized on the same principle as the Connal. This amount represents decidedly more than 10 per cent. of the annual production of pig in Great Britain. The Connals stores are at Glasgow, and are well known in the iron world. On all this stored iron, certificates or warrants are issued, and they are current on the street like other securities, fluctuating with the market value of the iron.

IRON STRIKES IN 1888.

Of the 679 strikes and lock-outs reported by *Bradstreet's* in 1888, 79 were among the iron and steel trades and allied industries. Compared with 1887, they are as follows:

	No. Strikes. 1888.	No. Strikes. 1887.	No. Strikers. 1888.	No. Strikers. 1887.
Iron and steel workers	60	81	69,833	32,989
Machinery	9	19	967	2,542
Molders'	10	36	372	7,457
Total	79	136	71,172	42,988

In industries immediately affecting the iron trade there were 122 strikes, as follows:

	No. Strikes. 1888.	No. Strikes. 1887.	No. Strikers. 1888.	No. Strikers. 1887.
Coal miners	51	59	37,421	58,475
Coke burners	9	4	3,445	13,925
Railway employes	62	67	18,078	28,682
Total	122	130	58,944	101,082

While it will be noticed that there was a less number of strikes in the iron trades last year than the year before, the number of men involved was larger by 66.8 per cent. This in marked contrast with the fact that there was a decrease in the total number of strikes of all kinds in 1888 of 38 per cent.

In the above strikes among iron-workers, the results were as follows:

	Successful. 1888.	Successful. 1887.	Unsuccessful. 1888.	Unsuccessful. 1887.
Iron and steel works	18	44	42	37
Machinery	5	8	4	11
Moulders	3	30	7	6
Total	26	82	53	54

In the following table is shown the number of days lost by iron strikers in 1888:

	Unsuccessful Strikes.—Days lost.— 1888.	Unsuccessful Strikes.—Days lost.— 1887.	Successful Strikes.—Days lost.— 1888.	Successful Strikes.—Days lost.— 1887.
Iron and steel workers	391,965	247,834	1,041,768	281,410
Machinery	15,408	19,440	21,610	3,515
Molders	3,787	53,553	490	205,739
Total	411,160	320,827	1,063,868	490,664

Again comparison shows that, while in the aggregate there were 25 per cent. less days lost in 1888 than in 1887, there was an *increased* loss in the iron, steel and machinery trades of 84 per cent. It will be interesting to know that there were 7,562,480 days' labor lost by strikes of all kinds in 1888, of which 1,475,028 were lost by iron workers. Taking $1.50 as the average day's wages of each striker, the total loss in wages in 1888 would be $11,343,720, a decrease from 1887 of 26 per cent. On the same basis, the loss to the iron-workers would be $2,212,542.

Nearly 38 per cent. of the total strikes of 1888 were successful, while 50 per cent. of the employes involved gained their demands.

HOW THEY HANDLE POOLS IN AUSTRO-HUNGARY.

From our esteemed contemporary, the *Hungarian Metal-Worker*, we learn of a curious trade complication that could only happen in that country. The steel rail manufacturers of Hungary found it necessary to secure protection from foreign competition. They attributed this competition to the cheap rates offered by the railroads. The government, which owns the railroads, was accordingly asked to increase the rates to a protective point. Three times the schedules were advanced, until German and Russian rails are no longer able to command the market. So far so good. The next turn in the wheel brought a combination among the rail mills to shut down and thereby force prices still higher, having now, as they thought, everything their own way. Here was a dilemma, but the government was equal to it. It promptly notified the rail men that unless they immediately rusumed operations and sold rails at former prices, they would be prosecuted for illegally forming a pool! The next move will be watched with interest.

PROFESSOR EDWARD ORTON, State Geologist of Ohio certainly competent authority, does not lay much stress on the permanency of the natural gas supply. At the recent meeting of the Ohio Institute of Mining Engineers, he stated that natural gas was a stored body and did not generate. The average of a gas well at Findlay was three years, and, as the fields were developed, he did not think it would be so long. He favored retaining natural gas for domestic purposes and the manufacture of glass. If its general application be continued it could not be expected to last. Mine Inspector Hazeltine stated that less coal was displaced in Ohio this year by gas than any year since its introduction.

UNIVERSAL sorrow has prevailed in Cleveland iron circles, the past week, over the sudden death, in a railway accident in Michigan, of Mr. Horace A. Tuttle, of the well known iron firm of Tuttle, Oglebay & Co. Mr. Tuttle was a genial companion and a first-class business man, and his loss is severely felt.

THE exports of iron ore from Bilbao, Spain, in 1888, were about 3,580,000 tons, or about seven-tenths of the production of the Lake Superior mines.

THE *National Labor Tribune* wittily remarks that the Pittsburgh Traction Company has "almost enough water in the stock to warrant the engagement of gondoliers instead of gripmen."

A REMARKABLE feature of the *Mid-Winter Century* is the opening articles on "Gerome," the famous French artist and trainer of artists. Gerome himself has helped n the preparation of Mrs. Hering's article by permitting the engraving of some of his most interesting pictures, which have not yet been seen in America, as well as some of his studies for pictures. Supplementary to this article there are published "Open Letters" on Gerome, by the well-known American artists, George de Forest Brush, E. H. Blashfield, Kenyon Cox, Wyatt Eaton, Will H. Low, John H. Niemeyer, S. W. Van Shaick, A. H. Thayer and J. Alden Weir. All of these artists were pupils of Gerome's in the Beaux Arts, except Mr. Blashfield, and he is indebted to Gerome for criticism and advice. Other specially artistic features of this number are Mr. Cole's engravings from the originals of Simone Memmi, with accompanying articles by Mr. Stillman and Mr. Cole, in the series of "Old Italian Masters"; also the fourth of Mrs. Mary Hallock Foote's Pictures of the Far West, "The Orchard Wind-Break."

EDGAR SALTUS'S new novel, "A Transaction in Hearts," forms the leading feature of *Lippincott's Magazine* for February. R. H. Stoddard continues his literary reminiscences with an interesting sketch of Nathaniel Hawthorne. The ninth story in Tourgee's series, "With Gauge & Swallow," is entitled "Missionary Joe," and is a clever and ingenious bit of work. Miss Frances E. Wadleigh tells of her "Experiences as a Government Clerk," and "An Ex-Editor" has a bright, shrewd, and humorous sketch entitled "The Days when I Went Journaling."

Scribner's Magazine for February has a notable list of contributors, among them the Rt. Rev. Henry C. Potter, Bishop of New York; Ex-President Andrew D. White of Cornell; Austin Dobson, Robert Louis Stevenson, W. C. Brownell, George Hitchcock, and Richard Henry Stoddard. There are several richly illustrated articles, short stories by George H. Jessop and Brander Matthews, essays upon art subjects, one of Dr. Sargent's papers upon physical training, this time about women, and poems by C. P. Cranch, Maybury Fleming, and others.

HON. A. P. SWINEFORD has sold his interest in the Marquette (Mich.) *Mining Journal* to Mr. J. W. Longyear, and the paper will be Republican in politics hereafter. The *Journal* has long maintained the front rank among Lake Superior mining papers.

THE Jubilee Number of the Chicago *Journal of Commerce* was a creditable affair.

PRODUCTION OF PIG IRON IN THE UNITED STATES IN 1887 AND 1888.

Statistics collected from the Manufacturers by The American Iron and Steel Association.

Production in 1888—7,269,628 Net Tons, or 6,490,739 Gross Tons. Stocks at Close of 1888—336,161 Net Tons, or 300,144 Gross Tons.

PRODUCTION OF ALL KINDS OF PIG IRON.

TOTAL PRODUCTION OF PIG IRON.

States.	Blast Furnaces. In blast July 1, '88.	Dec. 31, 1888. In	Out	Total.	Production. Tons of 2,000 lbs. (Includes spiegeleisen.) First half of 1888.	Second half of 1888.	Total for 1888.
Maine	1	1	....	1	2,550	3,024	5,574
Massachusetts	2	2	2	4	7,005	6,243	13 248
Connecticut	4	5	4	9	10,236	11,408	21,644
New York	15	16	24	40	134,906	122,280	257,180
New Jersey	6	8	10	18	50.393	51,489	101.88
Pennsylvania	130	146	92	238	1,630 845	1,958,341	3.589,186
Maryland	3	4	11	15	6,25	11,3 6	17,6 6
Virginia	12	13	20	33	92.495	104.901	197,396
N. Carolina	1	1	1	2	1,[illegible]00	1, [illegible]0	2,400
Georgia	2	2	2	4	23,658	15,739	39,397
Alabama	23	25	13	38	169.696	279 796	449.492
Texas	1	...	1	1	2,968	3,6 9	6,587
West Virginia	1	3	6	9	45,601	49,668	95.259
Kentucky	6	6	1	7	21.267	35,523	56,790
Tennessee	14	15	5	20	1[illegible]2,817	145.114	26[illegible],931
Ohio	38	47	30	77	528,536	575,282	1,103,818
Indiana	1	2	....	2	7.300	7,960	15,260
Illinois	7	11	5	16	294 52	284,787	579,307
Michigan	12	12	15	27	106,578	106.673	213,251
Wisconsin	6	8	4	12	51,477	64,560	116,037
Missouri	4	3	8	11	60,789	30,994	91,783
Minnesota	.....	.....	.....	*	.....	.....	.....
Colorado	1	1	1	2	11,522	10,476	21,998
Oregon	.....	1	...	1	.....	2,509	2,509
California	.....	...	1	1	.....	.....	.....
Wash'n Ty	.....	1	...	1	.....	4,093	4,093
Total, 1888	290	333	256	589	3,382,503	3 887,125	7,269,628
Total, 1887	306	339	244	583	3,415.210	3,771.996	7.187,206

PRODUCTION OF CHARCOAL PIG IRON.

Maine	1	1	.....	1	2,550	3,024	5,574
Massachusetts	2	2	2	4	7.005	6,243	13,248
Connecticut	4	5	4	9	10,236	11.408	21,644
New York	4	3	7	10	10,710	9,249	19,959
Pennsylvania	5	5	15	20	8.579	6 560	15,139
Maryland	3	4	6	10	6,250	9 452	15,702
Virginia	5	5	15	20	2,007	5,428	7,437
N. Carolina	1	1	1	2	1,100	1,300	2,400
Georgia	.....	1	1	2	.....	300	300
Alabama	10	8	3	11	43.791	50,355	94,126
Texas	1	.....	1	1	2,968	3,619	6,587
West Virginia	.....	.....	3	3	.....	.....	.....
Kentucky	2	2	1	3	780	4.274	5,054
Tennessee	5	5	5	10	25,854	25.996	51.8 0
Ohio	9	8	8	16	8 103	13,761	21,864
Michigan	12	12	14	26	106,578	106,673	213,251
Wisconsin	4	5	3	8	28,871	40,886	69,757
Missouri	2	2	1	3	12,856	15,441	28.297
Minnesota	.....	.....	.....	*	.....	.....	.....
Oregon	.....	1	.....	1	.....	2,509	2,509
California	.....	.....	1	1	.....	.....	.....
Wash'n Ty	.....	1	.....	1	.....	4,093	4,093
Total, 1888	70	71	91	162	278,238	320,551	598,789
Total, 1887	72	74	94	168	263,428	314,754	578,182

PRODUCTION OF BITUMINOUS COAL AND COKE PIG IRON.

New York	1	1	2	3	18.732	33 342	52.074
Pennsylvania	49	56	21	77	822,668	1,112,678	1,925,347
Maryland	.....	.....	2	2	.....	1 904	1.904
Virginia	7	8	5	13	90 488	99 473	189 961
Georgia	2	1	1	2	23,658	15.439	39 097
Alabama	13	17	10	27	125,905	229.461	355,366
West Virginia	1	3	3	6	45,601	49,658	95,259
Kentucky	4	4	.....	4	20,487	31,249	51,73
Tennessee	9	10	.....	10	96.963	119,118	216,081
Ohio	29	39	22	61	520.433	561,521	1.081.954
Indiana	1	2	.....	2	7.3 0	7,960	15,260
Illinois	7	11	5	16	294,520	284,787	579,307
Michigan	.....	.....	1	1	.....	.....	.....
Wisconsin	2	3	1	4	22,606	23.674	46,280
Missouri	2	1	7	8	47.933	15.5 3	63,486
Colorado	1	1	1	2	11.522	10,476	21,998
Total, 1888	128	157	8[illegible]	238	2,148,817	2,596 293	4.745,1 0
Total, 1887	97	147	72	219	1,950,339	2,3.0.296	4.270,635

PRODUCTION OF ANTHRACITE AND ANTHRCITE AND COKE PIG IRON.

New York	10	12	15	27	105,458	79,689	185,147
New Jersey	6	8	10	18	50,393	51,489	101,882
Pennsylvania	76	85	56	141	799,597	839,103	1,633,700
Maryland	.....	....	3	3	.....	.....	.....
Total, 1888	92	105	84	189	955,448	970,281	1 925,729
Total, 1887	137	118	78	196	1.201,443	1.136 946	2.338,389

*One stack building.

STOCKS OF ALL KINDS OF PIG IRON.

TOTAL STOCKS OF UNSOLD PIG IRON.

States.	Tons of 2,000 lbs. Dec. 31, 1885.	Dec. 31, 1886.	Dec. 31, 1887	Dec. 31, 1888
New England	8 997	9,218	7,930	11,266
New York	32,[illegible]96	28,[illegible]02	35,019	31.224
New Jersey	4.126	1.632	22,211	23,817
Pennsylvania	117.209	71.202	154.175	109 603
Maryland	10,145	5,455	1.16	1.900
Va., N. C., Ga. and Texas	31,311	13,346	6,848	18,913
Alabama	17.693	14,025	14,248	23 851
West Virginia	4.300	4 680	4,835	40[illegible]
Kentucky	5,819	4,218	4 324	8.970
Tennessee	18,667	14,488	7 7 6	8 282
Ohio	39 949	24,069	33 0 7	37,1[illegible]3
Michigan and Indiana	68,479	41,753	39,319	39,886
Illinois	3,834	300	.....	
Wisconsin	9.425	6,002	845	7,173
Missouri	38.058	7,692	5.329	11.701
Pacific States	5.707	6,232	1.159	2.682
Total	416,512	252,704	338,142	336.161

STOCKS OF UNSOLD ANTHRACITE AND ANTHRACITE AND COKE PIG IRON.

New York	16,257	22,070	27,662	26,574
New Jersey	4.126	1,632	22.211	23.817
Pennsylvania	46,795	26,801	64,234	56,138
Maryland	1,000	.....	.....	.....
Total	68,178	50,503	114,107	106.529

STOCKS OF UNSOLD CHARCOAL PIG IRON.

New England	8,997	9 218	7,930	11,266
New York	16,539	6.132	7.357	4.650
Pennsylvania	13 452	12,905	8,876	7,904
Maryland	8,769	4,755	1,167	1.000
Va., N. C., Ga and Texas	22,510	8.122	3,678	6,063
Alabama	10,530	2,892	10,320	11 746
Kentucky	4 319	3,718	3,074	2,8 9
Tennessee	17 967	12,488	2,900	4,228
Ohio	21,412	10.128	4.410	4,480
Michigan	68,779	41,953	39,319	44,349
Wisconsin	4,998	6 [illegible]62	538	
Missouri	29,373	7 022	5,329	10,194
Pacific States	5,707	6,232	1,159	2,682
Total	232 352	131,567	96,057	111,371

STOCKS OF UNSOLD BITUMINOUS COAL AND COKE PIG IRON.

Pennsylvania	56,962	31,496	81,065	44,961
Maryland	376	700	.....	900
Virginia	7,7[illegible]1	4,648	2,085	7,032
Alabama and Georgia	8,213	12,309	5,013	17,923
West Virginia	4,[illegible]00	4,680	4,835	400
Kentucky	1,500	[illegible]00	1,250	6,161
Tennessee	700	2,000	4 826	4,0 4
Ohio	18,534	13 941	28,597	32,623
Indiana	700	.....	.....	2,700
Illinois and Wisconsin	8,261	300	3[illegible]9	
Missouri	8,685	660	.....	1,507
Total	11[illegible],982	70,634	127,978	118,261

STOCKS ACCORDING TO FUEL USED.

Bituminous	115,982	70.634	127,978	118,261
Anthracite	68,178	50,503	114.107	106,529
Charcoal	232.3 2	131,567	96,057	111,371
Total	416 512	252,704	338.142	336,161

STOCKS OF PIG IRON IN PENNSYLVANIA AND OHIO DISTRICTS.

Pennsylvania.	Lehigh Val. anthracite	16,109	2,193	31,519	4,788
	Schuylkill Val. "	15,617	17,816	19,103	31,313
	Upper Susque. "	4,9[illegible]3	2,383	6,589	9,435
	Lower Susque. "	1[illegible],136	4,4[illegible]9	7,623	12,6[illegible]2
	Shenango Valley bitum.	17.347	13,371	29.9 5	17,857
	Allegheny County "	16,33[illegible]	.....	33 841	7,704
	Miscellaneous "	23,280	18.125	17,269	19,400
	Charcoal	13 452	12,905	8,876	7,904
Ohio.	Hanging Rock bitum.	3,240	4,[illegible]33	4,062	13,792
	Mahoning Valley "	8,938	1,463	12 365	2,531
	Hocking Valley "	3,846	1.945	2,301	9 557
	Miscellaneous "	2,510	6 000	9,869	6,743
	Hanging Rock charcoal	16.361	10,1[illegible]8	3,610	4,480
	Miscellaneous charcoal	5,041	.....	800	...

MISCELLANEOUS PIG IRON STATISTICS.

PRODUCTION OF PIG IRON IN 1886, 1887 AND 1888.

States.	Tons of 2,000 pounds. 1886.	1887.	1888
Maine	5 060	4.397	5 574
Massachusetts	8.124	11,1[illegible]4	13.248
Connecticut	19,390	21.741	21,644
New York	233 618	296.572	2 7,180
New Jersey	1[illegible]7,886	172,5 3	101,882
Pennsylvania	3,[illegible]93,286	3,684.618	3,589 186
Maryland	30,5[illegible]2	37,427	17,6 6
Virginia	156,250	175.715	197 396
North Carolina	2,200	3 610	[illegible],400
Georgia	46,49[illegible]	40,947	39,397
Alabama	283.859	292,76[illegible]	449.492
Texas	3 250	4,383	6,587
West Virginia	98,618	82,311	9[illegible],259
Kentucky	54,844	41,907	[illegible]6 790
Tennessee	199,166	230 344	267 9 1
Ohio	908,[illegible]94	975, 39	1,1[illegible]3,818
Indiana	16 660	13,211	1[illegible],560
Illinois	501 795	565,4[illegible]8	579 3 7
Michigan	190 734	213,[illegible]48	213,2[illegible]1
Wisconsin	65 933	133,5[illegible]8	116 037
Missouri	74,5 3	138 643	91.7 3
Colorado	10,451	25,291	21.998
Oregon	.....	.....	2,5[illegible]9
California	1,7[illegible]0	.....	.....
Washington Territory	2,842	1,586	4.093
Total	6,365,328	7.187,[illegible]06	7,[illegible]69,6[illegible]8

PRODUCTION IN 1888 ACCORDING TO FUEL USED.

Fuel Used.	Blast Furnaces. In blast July 1, '88.	Dec. 1, 1888. In	Out	Total.	Production. Tons of 2,000 lbs. (Includes spiegeleisen.) First half of 1888.	Second half of 1888.	Total for 1888.
Anthracite	92	1[illegible]5	84	189	955 448	970.281	1,925.729
Charcoal	70	71	91	162	278,238	320.551	598.789
Bituminous	128	157	81	238	2,148,817	2,596,293	4,745.110
Total	200	333	256	589	3.382,503	3.887.125	7 269,628

PRODUCTION IN CERTAIN DISTRICTS IN 1888.

Pennsylvania.	Lehigh V	26	29	19	48	273.667	285,287	558 954
	Schu'l "	22	26	16	42	237.854	241,410	479 264
	U. Sus. "	8	10	8	18	78,901	86 333	165.234
	L. Sus. "	23	22	14	36	246,188	289,073	535 261
	Shen. "	14	15	7	22	201 556	264.290	465.846
Ohio.	Alle'y Co.	16	20	.....	20	360.182	530,387	890.569
	Mis. bit.	16	19	13	32	223 918	255.001	478,919
	Charcoal	5	5	15	20	8,579	6 560	15,139
	H. R. bit.	9	7	6	13	60,670	46,182	106,852
	Mah. Val.	6	11	3	14	217.607	211,968	429.575
	Hock. "	5	8	7	15	48,024	44 784	92 808
	Mis bit.	9	13	6	19	194,132	258 587	452.719
	H. R. char.	9	8	7	15	8,103	13.761	21,861
	Mis. char.	.....	.....	1	1	.....	.....	.....

PRODUCTION OF BESSEMER PIG IRON IN 1888.

New York	18 732	33 342	52 074
New Jersey	14,585	12 820	27,405
Pennsylvania	746 479	1,024,065	1,770,544
Maryland	.....	.....	.....
West Virginia	38,557	45,576	84,133
Tennessee	2,315	.....	2,315
Ohio	138,828	197 927	336 755
Illinois	275,675	275,401	551 076
Missouri	54,144	22,376	76 520
Michigan	3,000	.....	3,000
Wisconsin	17,136	17,400	34,536
Colorado	10,478	10,000	20,478
Total	1,319 929	1,638 907	2,958,836

PRODUCTION OF BESSEMER PIG IRON IN PENNSYLVANIA AND OHIO DISTRICTS IN 1888.

Pennsylvania.			
Lehigh Valley	101 125	87.954	189,079
Schuylkill Valley	46.883	40,915	87.798
Upper Susquehanna	47,738	49.481	97 219
Lower Susquehanna	191,480	232,181	423 661
Shenango Valley	90 085	132 937	223.022
Allegheny County	167.814	364.776	532,590
Miscellaneous Bituminous	101,354	115,821	217.175
Ohio.			
Mahoning Valley	11,239	24,155	35.394
Hocking Valley	.....	5.014	5,014
Miscellaneous Bituminous	127.589	168,758	296.347

The quantity of pig iron made with anthracite coal alone in the first half of 1888 was 107,802 net tons; in the second half, 169,713 tons: total, 277.515 tons. In 1887, 418,749 tons.

PUMPS: THEIR HISTORY AND CONSTRUCTION.

Phillip R. Bjorling, of Manchester, Eng., has recently published a work on the above subject. The author says that the pump was invented about 120 B. C., and that Agricola, in the year 1550, writes that pumps were then used in the German mines. In 1714, John Potter, of Chester-le-street, constructed a pump 9 in. in diameter—made of elm. With respect to the classification of pumps, the term "pump" implies a machine for the purpose of raising water or other liquids by means of atmospheric pressure; and a pump in its simplest form consists of a barrel into which fits a bucket. Lift pumps and force pumps are illustrated, and with respect to the plunger pump it is pointed out that Mr. Henry Davey, of Leeds, has overcome the disadvantage of working with this pump vertically, by means of turning the pump upside down. The pulsometer pump, or, more correctly, pumping engine, is said to be simply an ingenious and compact arrangement of the old atmospheric engine; many improvements in it have been made, add the best known pump in England is that manufactured by the Pulsometer Company, in London. The author adds some remarks on designing pumps and valves, as that all valves and ports should be arranged to obviate the possibility of air lodging at any part, and points out the advantages and disadvantages of different classes of pumps—as that in ram pumps there is less friction in the ram working through a stuffing-box. He also makes some general remarks and deals with the subject of pump-valves, which he considers to be the most important part of a pump, spear or well rods and air vessels, whose more important use is to relieve the pressure.

The Danish Sound tunnel has found a successor in the shape of a projected bridge across the sound at its narrowest place, between Elsinore, in Denmark and Helsinborg, in Sweden. The distance is there 18,000 feet, and the greatest water depth is about seventy feet.

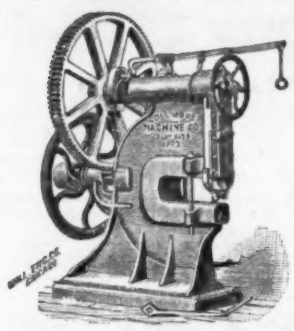
A Steel-Rail Combine Abroad.

Shares of industrial concerns, especially iron and steel works, have experienced a boom on the strength of the report that the English and German steel-rail makers have renewed their convention. The price of steel rails has risen to 132 marks per ton, the producing cost in Germany being only 90 marks. The fact that the convention is not signed and that the negotiations are in suspense has not affected the eagerness of the speculators.

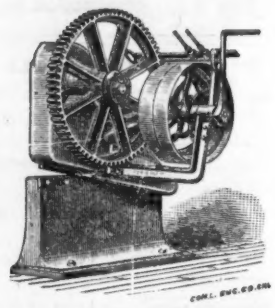
Cast-iron will expand and contract between the extreme ranges of temperature in this country with a force equal to 4¼ tons per square inch of surface exposed.

COLUMBUS MACHINE CO., Columbus, O.

—MANUFACTURERS OF—



Blast Furnace, Stationary, Portable and Hoist Steam Engines,



Boilers, of all descriptions; Rolling Mills; Drop Presses; Shears for Rail, Bar and Plate Rolling Mills; Punches and Shears—Single and Combined; Boiler and Sheet Iron Rolls—Hand or Power; Boiler Makers' Shears and Punches; Shafting; Couplings; Hangers and Pulleys.

Blowing Engines, and Blast Furnace Work in all its branches, a specialty.

Also HEAVY CASTINGS AND MACHINERY WORK.

☞BLAST FURNACE ENGINES ON HAND.

HOW THE NEW YEAR OPENS UP IN THE SOUTH.

Baltimore Manufacturers' Record.

Reports to the *Manufacturers' Record* show that there is no let up in the industrial development of the South, but rather that it steadily gains momentum. The same wide diversity of enterprises covering the entire South, as previously mentioned, continues, and there are signs that at many places the remarkable industrial activity will tend to revive speculation in real estate. It could not well be otherwise in view of the wonderful growth that many towns are now making. Among the most important enterprises reported by the *Manufacturers' Record* in this week's issue are five companies at Florence, Ala., to build a $1,000,000 cotton mill, $300,000 agricultural implement works, to invest $1,000,000 in completing a furnace, enlarging an old cotton mill and developing water powers, to build $50,000 hosiery mill and $100,000 wagon factory; a $100,000 cotton mill company at Anniston, and rumors of a new furnace, rolling mill etc., at same place; over $250,000 for enlargement of gas works at Montgomery and erection of electric plant; a $50,000 and a $45,000 lumber mill in Arkansas; $500,000 company to build an industrial town in Kentucky; foundry and machine shop at High Point, N. C.; furniture factory at Greenville, S. C.; $20,000 gas works at Tuskaloosa, Ala.; $50,000 canning factory company at Ennis, Texas; a contract for jetty work amounting to $1,250,000 has been given by a private company, which will build a harbor at mouth of Brazos river, Texas; Houston is to have a $100,000 electric plant; New Birmingham, Texas, one to cost $25,000; Tyler a foundry in connection with new car works, and West Virginia new $60,000 coal mining company.

These are fair illustrations of the South's industrial developments as indicated by the leading enterprises reported for one week only. Even this is but a summary and does not begin to include all, for there is scarcely a city or town of any importance in the South which is not organizing or getting ready to organize new industries. What will be the grand results of the entire year, with this one week as a sample, and the spirit of activity daily spreading out to every village and hamlet, and the tendency growing stronger for the investment of many millions of Northern capital?

PROGRESS OF THE FORTH BRIDGE.

The twenty-third quarterly report of inspection by Major-General Hutchinson, R. E, and Major Marindin, C. M. G., R. E., on the Forth Bridge works, Scotland, has just been published. At South Queensferry, nearly the whole of the principal members of the second bay of the south cantilever are stated to be complete, and the bottom members of the third bay with three-fourths of their bracing are built out to the commencement of the junctions with the fourth bay. The work done on the north cantilever is rather more advanced than that on the south. The riveted work at South Queensferry now amounts to about 10,600 tons, an addition of about 1,830 tons during the quarter, as compared with 1,545 tons during the previous quarter. At Inch Garvie, in the south cantilever, with the exception of a small portion of the struts with their bracing, and a portion of the internal viaduct, the whole of the first bay is completely built and riveted. Nearly the whole of the second bay is also complete. In the north cantilever, the work executed on the first bay is almost identical with that on the south cantilever, and practically the whole of the second bay is in place, and nearly one half is riveted. Considerable progress has also been made with the third bay in each case. The total amount of riveted steel work at Inch Garvie is about 12,400 tons, an addition of about 2,400 tons during the quarter, as compared with 1,630 tons during the previous quarter. At North Queensferry, nearly the whole of the second bay of the south cantilever is erected, and more than two-thirds riveted. The only portions remaining to be executed are one length of flange plates on the top members, and the flooring and wind fence of the internal viaduct. The bottom members of the third bay with one-half of their bracing are built as far as the junctions with bay 4, and the greater portion of these junctions is in place. The second bay of the north cantilever is advanced fully as far as that of the south cantilever. The bottom members of the third bay, with one-half of their bracing, are built for a distance of 435 feet from the vertical columns, and riveted for about 350 feet. The total quantity of riveted steel work at North Queensferry amounts to about 11,000 tons, an addition of about 2,170 tons during the quarter, as compared with 1,440 tons during the previous quarter. On the whole bridge up to the present date about 614,000 cubic feet of granite have been delivered, 610,000 cubic feet have been set, and about 113,250 cubic yards of rubble masonry and concrete work have been built. In all, 53,680 tons of steel have been delivered, an addition of 1,150 tons during the quarter, as compared with 1,210 tons during the previous quarter.

The Proposed International Steel Rail Syndicate.

It is stated that a large firm of steel rail makers on the West coast, who have hitherto opposed all suggestions for a new syndicate, have within the last two days withdrawn their opposition, and expressed their willingness to join. A meeting of the English firms has accordingly been summoned to be held in London during the next few days. Considerable satisfaction has been expressed, especially in Staffordshire, at the prospect of an agreement being arrived at, but we doubt whether the syndicate will be of much permanent benefit to English makers. It may induce higher prices for a time, and force into the market orders which might not immediately have been put in, but there, we believe, the advantage will end. The history of the last Railmakers' Syndicate is certainly not an auspicious augury for that which is now proposed. The German steelmasters have, it is stated, been informed that they will be voted a smaller proportion of orders than under the last syndicate, and that all Indian as well as English orders will, under the new scheme, be the sole property of British works. The Germans, though at first strongly objecting to these conditions, have now consented. There are fourteen rail firms in England, namely, three Cleveland, four West Coast, two Sheffield, and five Welsh, and all are expected to join the new combination.—[Iron and Coal Trades Review, London.

Iron Mining in Nova Scotia.

To the Editor of the IRON TRADE REVIEW:

PICTOU, VIA STELLARTON, N. S., January 22.—Mr. J. H. Bartlett, of Montreal, well known in connection with the Canadian iron trade, has been here for some days in the interest of the Pictou Coal & Iron Company, of Montreal, and has obtained from the County Council a cash subsidy of $20,000, as well as remission of all taxes for twenty years. Mr. Bartlett has made a contract with R. G. Reid, of Montreal, for the construction of a branch railway, ten miles long, leading to the iron mines, and the Dominion Government have arranged to operate the branch as a part of the Intercolonial and provide all the rolling stock. It is estimated that over ten million tons of iron ore can be easily and cheaply mined from the Pictou Coal & Iron Company's mines, which are only seven miles from the Pictou coal mines and ten miles from Atlantic tide water. The prospects of this company are splendid. The location of the blast furnaces has not yet been definitely settled.

MORE BIG GUNS.

The House Committee on Naval Affairs has completed its report to accompany the annual appropriation bill. Among the items is one of $625,000 in addition to the $1,000,000 appropriated two years ago for the establishment at the Washington Navy Yard of the necessary plant for the assembling and building of the most powerful modern guns. The work already accomplished in the building of modern guns for the navy is set forth in the report. The contract made in June, 1887, with the Bethlehem Iron Company was for forgings for fifty 6-inch, six 8-inch, twenty-one 10-inch and two 12 inch guns. These will complete the batteries for the four monitors begun in 1876, and for the Charleston, Baltimore, Bennington, Philadelphia, Newark, San Francisco, Maine and Texas.

It is expected that the company will begin to deliver forgings within the next three months, although the contract does not require a delivery until February 18, 1890. The report says:

"The Ordnance Department is now assembling with the plant we have already at the Navy Yard, D. C, guns which are, of their size, first-class in every particular. The Boston, Chicago, Atlanta and Dolphin carry nineteen 6-inch modern breech-loading rifled guns and eight of 8 inches. Of these, six of the former and four of the latter class were made at the Washington Navy Yard. There are besides these on hand, finished, at the Washington yard, six 6 inch guns and three 10-inch guns, besides eight 6-inch guns about seven-eighths complete.

When the works at that yard shall be completed, the average time of assembling there a 6-inch gun will be, say, 100 days, a 12 inch gun, 200 days, etc. The annual capacity of the yard, it is estimated, will be at the rate of twenty-five 6 inch and twelve 12 inch guns. The plant is to be fitted to manufacture as high as 16-inch guns. We are also constructing guns by contract at the South Boston Iron Works and the West Point Foundry, at present, six at each place, to be completed in July and August of the present year. The guns made at the Navy Yard have so far been somewhat cheaper than those furnished by contract. The tests to which our new guns have been submitted show them to be equal to any made at the long established workshops in Europe. We have at the proving ground one 10-inch gun carriage manufactured at the Washington Navy Yard, and three others will be completed within two months; also two 6-inch carriages completed and thirty-one others more than half finished, all at the Washington Navy Yard. The contract with the Hotchkiss Arms Company is for ninety-four rapid-fire guns, consisting of thirty 6-pounders, twenty-two 2-pounders, ten 1-pounders, and thirty-two 37-millimetre guns.

Early Suspension Bridges in the United States.

The earliest bridges of the suspension type built in the United States were chain bridges, constructed by Finlay, and are believed to have been the first of this type anywhere, if we except the primitive suspension structures of China, Burmah, and South America. The supporting portion of Finlay's bridges was a chain formed by seven feet links of square bar iron, from which the roadway (of wood) was hung by iron suspension rods. The first of these was a road bridge, built in 1796–7, over Jacob's creek, upon the highway between Uniontown and Greensburg, in Pennsylvania. It had a span of 70 feet. One of the earliest, if not the earliest, cable suspension bridges in this country was the famous one built in 1842 over the Schuylkill river, at Philadelphia, by Charles Ellet, Jr. It had a span, from centre to centre of towers, of 358 feet. It remained in service for about thirty years, when it was replaced by a bridge of larger capacity.—[The Manufacturer and Builder.

Industrial Notes

Blast Furnaces:—

Ashtabula is asked to furnish land free for a $200,000 blast furnace.

The Crozer Steel and Iron Co., of Roanoke, N. C., will build an additional iron furnace at a cost of about $125,000.

The two blast furnaces which the Pennsylvania Steel Company are erecting at Sparrow's Point, Md., will be 85x22 feet.

A West Middlesex correspondent writes: About a year ago E. A. Wheeler offered to treat the "boys" to the oysters in case they made 200 tons of iron at the two furnaces in one day—twenty-four hours. This was thought to be almost an impossibility, as the capacity of both furnaces was only 150 tons, which was what they were built for. The employes, however, accomplished the Herculean task, and the fact was noted throughout the newspaper world, and the *Iron Age* even called it a phenomenal case. Now what would they say if they knew that the two plants with precisely the same machinery and capacity have produced 262 tons of No. 1 pig iron in twenty-four hours?

The *Sentinel* made mention, two weeks ago, of the leasing of the Victoria furnace, near Goshen, in Virginia, by some Logan and Columbus parties. We now learn that neither Mr. Walter Crafts or Mr. Vint Ferguson is interested in the lease. It is true, however, we are informed, that Mr. A. Magoon will be the general manager; Mr. Edward Orton will blow the furnace, while Mr. James H. Dilley, formerly of Baird's and later of Longstreth, will have charge of the store. Dr. Park, of Baird's, will also remove to Victoria and be the furnace physician.—Frank Baird was in town several days this week. He has severed his connection with King, Gilbert & Warner, of Columbus, and has leased a large iron furnace at Buffalo, N. Y., one of the largest and best built furnaces in the country. He left for Columbus last night, taking some of his old employes at the Baird furnace with him, and will begin at once putting the furnace in repair preparatory to going into blast in the spring.—[Hocking Sentinel, Logan, O.

Rolling Mills:—

The Pioneer Iron & Manufacturing Co., of Birmingham, Ala., have broken ground for their rolling mill.

The Montreal Rolling Mills Company, of Montreal, Canada, are making some extensive improvements to their plant, which will be completed about June next.

The Trinidad (Colo.) Rolling Mill is expected to begin work on the 1st of February. M. Lenhart is President, Henry Schneider is Vice-President, and F. A. Marriot is Superintendent of the company. They will make merchant iron from scrap.

The Hamburg Rolling Mill, at Hamburg, Berks County, Pa., owned by the Philadelphia & Reading Coal & Iron Company, has been leased to Mr. Walter Nevegold, of Philadelphia, from April 1, 1889. The mill has been idle for the last two or three years.

Notices were posted by the Pottstown Iron Company on the 21st inst., ordering a reduction in the puddling department of 25 cents a ton, making the price $3, the same as was paid during the panic of 1873. This reduction affects 300 men. It takes effect February 4.

Steel Works:—

The employes of the Lawrence Iron & Steel Works, at Ironton, O., struck for wages, the firm failing to pay on the regular pay-day.

The Edgar Thomson Steel Works have made over 1,000 tons of rails in a day. This would lay ten miles of track with rails weighing over 60 pounds to the yard. —[American Manufacturer.

On the 1st inst, the name of the Johnson Steel Street Rail Company, of Johnstown, Pa., was changed to Johnson Company. This company last Spring erected a new rolling mill at Johnstown for rolling steel rails.

Machine Shops and Foundries:—

D. E. Burgh will build a machine shop at Roanoke, Va.

The Central Railroad Co. will increase the capacity of their shops at Macon, Ga.

Struthers, Wells & Co., of Warren, Pa., inform us that they have just completed extensive improvements in their boiler shops. The buildings have been enlarged and new and improved tools added. In spite of increased facilities they find it necessary to run this department night and day.

The Newport News & Mississippi Valley Railroad Co. will build shops at Lexington, Ky., if $35,000 is donated.

The Lloyd Foundry & Machine Works, of Kansas City, are increasing their capacity by putting in a new steam forge and 1,200-pound steam hammer, and also nut and bolt machinery in a new addition adjoining their present shops.

Incorporated—Lamson Cutter Head Company, Chicago; capital, $100,000; to manufacture cutter heads, saws and other tools and machinery; incorporators, William H. Lamson, Peter Dignan, and Oliver W. Marble.—Lightning Tenoning Machine Company, Chicago; capital $10,000; for the manufacture of spoke tenoning machines; incorporators, C. G. Berlin, F. J. Gallings, and K. R. Smoot.

The Reliance Gauge Company, of Cleveland, O., have just received the fifth order from the Dick & Myer Co., whose sugar refinery is located at Brooklyn, N. Y., for their Reliance Safety Water Columns, and it calls for 15 of the No. 5 combined high and low water alarms "exactly like those furnished us some twenty months ago." This refinery first tried these safe-guards in October, 1886, and their endorsement in the form of repeated orders, after long continued and constant use, speaks volumes for the appliance, and must be highly gratifying to the manufacturers.

It has been practically decided that a large machine shop and foundry will be erected in Sault Ste. Marie, Mich., early next Spring. The plant will be located on the street which R. D. Perry will put in, running from Water street north to the Union Dock & Coal Company's warehouse. The building to be erected will be 100 feet long and 50 feet wide for half its length, and 40 feet wide the other half. The projectors of the enterprise are Thomas Pettigrew, of Owen Sound, and James Strachan, Sr., whose sons, James Strachan, Jr., and Archibald Strachan, are the well known machinists, whose shops are located on Magazine street.

G. A. Crosby & Co., of Chicago, manufacturers of sheet metal workers' machinery, have broken ground for a new factory to be located at 176 and 178 South Clinton street. The main building will be 140 feet deep by 40 feet wide. The first floor will be 160 feet deep, the extension being used for a blacksmith shop, one story high. The building will be four stories high, built of brick, with a pressed brick front, substantial stone foundations, and a flat roof. The air-shaft on the side of the building will have iron pillars with large windows filling the intermediate space. It is expected that the building will be completed by May 1, when the firm will remove from their present quarters at 269 to 273 Randolph street.

Fires in Iron Works:—

At Boyerstown, Pa., January 23, engine house of Phoenix Iron Co.; loss, $5,000.

At Jamestown, N. Y., January 21, axe works of E. F. Carpenter & Co.; damaged.

Hardware:—

Incorporated: Hanover Hedge and Wire Fence Manufacturing Company of Hanover; capital, $50,000.

It is reported that a company is being formed at Lynchburg, Va., under the name of the Lynchburg Wire Picket Company, for the manufacture of wire picket fence.

E. T. Fraim, Keystone Lock Works, Lancaster, Pa., who was recently burnt out, started up again in full on the 15th inst., and is now prepared to fill all orders promptly, as heretofore.

The Mail City Lantern Company, of Wheeling, W. Va., contemplate making some extensive improvements to their plant located on Water street in the above-named city at an early date.

The Emerson Malleable Iron Works has been organized at Emerson, Pa., by Jno. G. Lang, with a capital of $20,000. Active operation on the plant began Nov. 6, and already the principal foundations are completed, together with most of the brick work for the foundry. With favorable weather the buildings can be finished and the works in operation by March. The company will manufacture a large variety of malleable and grey iron castings, but builders' hardware and saddlery hardware will be their specialty.

Miscellaneous:—

A charter has been granted to the Tacony Iron and Metal Company, of Philadelphia; the capital stock is $150,000.

There is water-works agitation at Saltsburg, Pa.; Butte City, Mont.; Abington, Pa.; Roanoke, Va.; Myerstown, Pa.; Atlanta, Ga., Rogers Park, Ill.; Helena, Ark.; Jenkinton, Pa.

F. E. Meyers & Bro., Ashland, O., have favored us with a very neat poster and calender, showing the large patented and novel line of Meyers' pumps and hay tools, manufactured by them.

Dilworth, Porter & Co., of Pittsburgh, have let the contract for the erection of a one-story iron clad spike mill 48x150 feet, on the river bank between Fourth and Fifth streets, Southside. A number of the new spike machines will be put in, and employment furnished to an additional number of men.

Sealed proposals will be received at the Office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 13th day of February, 1889, for the labor and materials required for the interior finish of the Postoffice, Court House, etc., at Manchester, N. H., including iron stairs, the completion of floors, the plumbing, plastering, marble work, and joiner work, glazed, painted, and finished complete; (heating apparatus and approaches not included).

Mr. B. F. Packard, who is representing the Warren Iron and Steel Company in the West, was in South Bend, Indiana, the other day, and calling at the big Studebaker Carriage Works there, he saw a draft of President Harrison's White House carriages in process of construction. The firm bought several hundred tons of Warren-made iron, and the tires of the next President's carriage will doubtless be made of material turned out at the Warren mill.—[Warren (O.) Chronicle.

Kroger, Redway & Co., Cincinnati, make the following announcement: "Having succeeded to the business of R. J. Kroger & Co., we will continue to occupy the old office, Room No. 1, Allen Building, Fifth and Main streets, Cincinnati. We are agents for the celebrated Schoonmaker's Connellsville coke, best grades of West Virginia and Ohio (soft) coke and (Barton Mine) Piedmont smithing coal, favorably known as Cumberland Blossburg. We also deal in iron ore, mill cinder, scrap iron and rails, and are in a position to handle speedily and carefully all shipments made through us. A continuance of your patronage is solicited.

PATENTS GRANTED TO WOMEN.

A very curious document has just been issued by the Commissioner of Patents of the United States, entitled, "Women to whom patents have been granted by the United States Government from 1790 to 1888." It is a quarto of 44 pages, and records in round numbers about 2,500 patents, besides 57 re-issues. The first on the list was taken out by Mary Kies, in 1800, for "straw-weaving with silk or thread." Six years later Mary Brush obtained a patent for a corset, and then four years elapsed before another inventive woman appeared. This was Sophia Usher, whose patent was for carbonated liquid cream of tartar. Then, again in 1822, Julia Planton secured a patent for a footstool. During the four following years a patent was issued each year to a woman, and from that time down to the present the number of women patentees gradually increased. In recent years feminine inventiveness has shown marked progress. For instance, from the first of January, 1888, to the twenty-sixth of June last, no less than 66 patents were issued to women, while during the year 1887 179 patents were so issued. This latter is the largest ever issued. While the names of the articles patented show that they were generally in the line of female wearing apparel and household labor-saving devices, yet many of them were of a character that shows the multiplied interests of women. As an instance, one woman patented a submarine telescope and lamp. Others were granted as follows: Improvement in reaping and mowing machines, improved war vessel, furnace for smelting ores, apparatus for punching corrugated metals, method of construction for screw propellers, low water indicators, materials for packing journals and bearings, conveyors of smoke and cinders for locomotives, burglar alarms for windows, etc. Not one of these inventions appears to have revealed a new principle.

WATER gas is being used instead of coal for driving the machinery at the Leeds Forge Works, Eng. The cost of the gas delivered into the furnaces is 8 cents a thousand feet, and the saving effected at this one mill is £10,000 a year.

STEEL BLOOMS BILLETS AND SLABS — W. F. THORNTON — CLEVELAND, O.

SOFT STEEL.
Plates and Sheet.
CORRUGATED ROOFING.

Galvanized Iron. Patented Leveled Sheet.

The Standard Iron Co.,

BRIDGEPORT, OHIO.

J. D. SMITH & CO., Cincinnati, O.

Manufacturers of Every Description of

Foundry Facings, Blackings & Foundry Supplies

—PLUMBAGO FOR ALL PURPOSES.—

Radiant Facings and Blackings, Standard Core Compound. New Process Brass Moulding Sand. Illustrated catalogue and price list furnished on application.

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Harness and Carriage Hardware Manufacturers,

Malleable Iron, Composition, Wrought and Steel Forged Goods made to order. Finished in Japanned, X. C. Plate, Imitation Rubbers, Nickel, Silver and Gold Plated and Genuine Rubber Covered.

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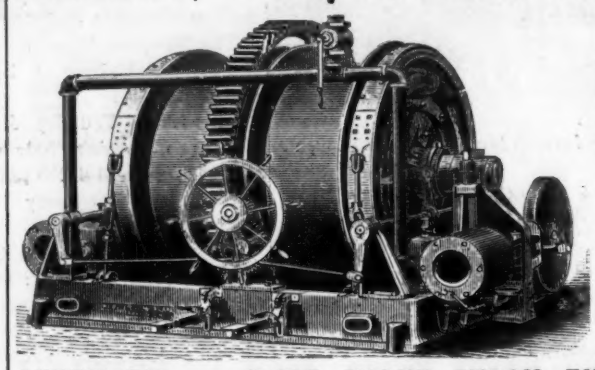

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THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

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INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

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THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 2

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MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

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CURRY & CO. general jobbers in Castings of all kinds. 43

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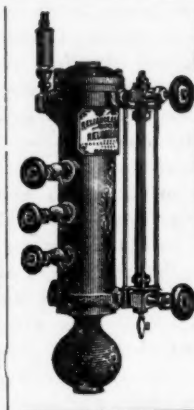

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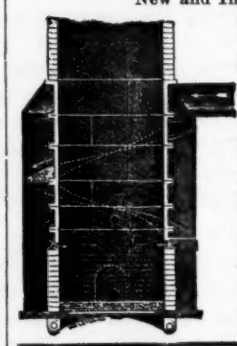

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(patent, March, 1881,) and New Smokeless and Automatic Feed Boiler, (pat. 1886 in U. S.) Correspondence solicited for plans of foundries and the economical working of cupolas, the saving of fuel in melting iron and steel, and in the production of steam. Address VICTOR COLLIAU, Mechanical Engineer & Architect, 287 Jefferson avenue, Detroit, Mich.

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MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, January 30, 1889.

Iron Ore.

Nothing is known, as yet, of any sales of ore, and the chances seem to point to the verification of the opinion hitherto expressed, viz., that the ore men, feeling secure, would rather await the opening of navigation than sell at forced and, necessarily, low prices. When, last year, the exigencies of the case combined to defer the usual January sales until April and May, there was much speculation as to the probable effect of the step, and in some quarters the postponement of sales was thought to indicate grave danger. The season's business, however, has effectually disproved these fancied troubles, and the lesson of last year is likely to impress itself upon those who, fearing the uncertainties of the market, sold too cheaply at the opening of the season. This year, they will be in no hurry, and their position is certainly a strong one. If a dull period early in the year is to be regularly expected, there can be no objection to a well defined policy of postponing the January sales until April. Such action would deprive the business of its speculative feature, and, while of little consequence to ore dealers, would better satisfy the furnace men who are unwilling buyers when their trade is dull. The lower lake ore docks are fast clearing away their stocks and another month or so will see very little ore awaiting rail shipment. The negotiations with Eastern ore consumers which, last year, were carried on through middlemen, will this year give way to direct deals with the furnaces that have tried lake ores and will use them in greater quantities than ever before. The vessel men are a trifle uneasy and talk of high freights, claiming $1.35 from Escanaba. This figure is too high by a fourth, however, in the opinion of shippers.

Pig Iron.

The market, to use a homely but none the less forcible expression, has gone all to smash, and furnacemen are correspondingly discouraged. No reason seems to be advanced for this state of affairs, but its presence is too severely felt for disputing it away. Up to the beginning of December, the business was healthy and brisk, and some furnaces declined to take orders for February and March delivery except at figures sufficiently high to take advantage of the anticipated advance. No stocks worth speaking of were on hand, and the consumption more than equaled current production. The decline was at first charged to the holiday season. Later on, the taking of inventories was made the pretext for hiding the slump, but these explanations are no longer accepted, and the bare fact of a serious decline is too obvious to require any further explanation. The slump is general in extent and as far reaching as may be. It extends from the tide-water furnaces to the far West, and serves to accentuate that evil of American manufacture—overproduction. The immense Southern furnaces entered into lively competition with lake iron and, as long as the consumption of all that was offered continued, no one was the loser. Now, however, great quantities of iron are dumped at Central points at prices which other markets cannot meet and live, and the result has proved disastrous all around. We quote f. o. b. cars, Cleveland, four months:

No. 1 Bessemer	$17 20@17 70
No. 1 foundry	16 70@17 20
No. 2 foundry	15 70@16 20
No. 1 gray forge, red short	15 20@15 70
No. 2 gray forge, neutral	14 70@15 20
No. 1 American Scotch	16 70@17 20
No. 2 American Scotch	15 70@16 20

Manufactured Iron.

No improvement is reported in any branches of this industry. Bars are weak, sheets are not in demand, building shapes are cheaper, and rails do not find a ready market as yet.

Scrap Iron.

The dullness of the market in general makes itself severely felt here, and no sales worth speaking of are reported.

Hardware.

The trade is quiet and only fairly good. Metals are steady, promising to advance.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

There has been an absence of any large dealings in this market during the past week. On account of the low offers made here recently by some Southern furnaces and the very low prices at which these irons have been sold in other sections, buyers are inclined to wait until values are more settled and they can feel sure prices have reached the lowest point. Most coke irons are lower in sympathy. While Lake Superior charcoal is being held at prices asked a month ago, it is a question whether they will not also be affected. Makers of this grade claim that consumption will be fully up to the production, and therefore no cause exists for lowering quotations. We quote for the present as follows (Jan. 28):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 50@$20 00; Lake Superior coke, cinder mixed, $18 00@$18 50; Standard Ohio Blackband, $19 5 @ $20 00; Southern No. 1, $17 25@$17 75; Southern Gray Forge, $15 25@$15 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 00@$20 50.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

There has been a somewhat better feeling during the past week, and, while the range of prices has been very low (in fact the lowest yet reached) the volume of business has been very large. Buyers in some cases believe that the bottom has been touched, and are willing to take hold heavily. The rank and file, however, look for lower prices yet, and hold off. We quote for cash f. o. b. Cincinnati (Jan. 26):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $15 25@$15 75; Ohio and Southern Coke, No. 2, $14 25@$15 00; Ohio and Southern Coke, No. 3, $13 75@$14 25; Ohio Soft Stonecoal No. 1, $15 50@$16 50; Ohio Soft Stonecoal No. 2, $14 50@$15 50; Mahoning and Shenango Valley, $16 50@$17 00. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 00@$22 50; Tennessee and Alabama Charcoal No. 1, $18 00@$18 50; Tennessee and Alabama Charcoal No. 2, $17 00@$18 00. FORGE—Strong Neutral Coke, $13 25@ $13 50; Mottled Neutral Coke, $12 75@$13 25; Cold Short Coke, $13 00@$13 50. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@ $25 00; Lake Superior Malleable & Car Wheel, $22 00@$23 00.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

There has been a number of sales effected during the last week at low prices, which continue to exist with little in sight that will cause reaction in the immediate future. Furnaces are accepting orders for the year's delivery, and the general feeling seems to be that they cannot hope for a change for some time. All grades of iron have been sold, especially foundry and bright irons. We quote as follows (Jan. 28):

Southern Coke, No. 1, foundry, (new classification) $14 25@$15 25; Southern Coke, No. 2, Foundry, (new classification) $14 25@ $14 75; Southern Coke, No. 3, Foundry, (new classification) $13 75@ $14 25; Grey Forge, $13 25@$13 75; White and Mottled different grades, $12 75@$13 25; Silver Grey, different grades, $13 00@$13 50; Southern Charcoal No. 1 Foundry, $16 25@$16 75; Southern Charcoal, No. 1, Mill, $14 75@$15 25; Southern Car Wheel, Standard brands, $21 75@$22 75; Southern Car Wheel, other brands, $15 00@$19 50. Hanging Rock Coke, No. 1, Foundry, $15 50@$16 00; Hanging Rock Charcoal, No. 1, Foundry, $19 50@$21 00; Hanging Rock, Cold Blast, $20 75@ $23 75; Hanging Rock, Warm Blast, $00 00@$00 00

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

Matters have been very quiet in Chicago and the Northwest since last report. There has been no business beyond carload buying, with a few unimportant exceptions. Prices rule very low, and views differ as to whether bottom is reached. There is some complaint among foundries of dull business, but generally the situation appears satisfactory. We quote for cash f. o. b., Chicago (Jan 30):

Coke and Bituminous Coal Foundry:-Ohio (Hanging Rock softeners), $18 50@19 00; Ohio (Black Band softeners), $18 50 @19 00; Ohio (Jackson county softeners), $18 00@00 00; Lake Ore and Cinder, $17 25@17 75; Southern coke foundry No. 1, $17 25@17 75; Southern coke foundry No. 2, $16 25@ 16 75; Southern coke foundry No. 3, $16 25@16 50. Southern Coke Softeners, No. 1, $16 25@16 75; Southern, No. 2, $15 75@16 25; Charcoal Foundry:—Lake Superior, No. 1 and 2, $20 00@00 00; Southern, $19 50@20 50; Hanging Rock, $21 00@23 50. Car Wheel and Malleable:—Standard Southern, $21 50@26 25; Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 50@ 24 50; Lake Superior, Nos. 3 to 6, $20 50@21 50.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

This week has witnessed the heaviest buying that has occurred in this market for many months, largely by the local pipe works, The grades were nearly all Southern coke iron No. 2 foundry, No. 3 foundry, No. 1 soft and mill iron. The prices were the lowest yet touched in this market, and the leading Southern furnaces say they cannot sell more at such figures.. Most of the Southern companies are now very heavily sold ahead. We quote as follows (Jan. 30):

Hot Blast Foundry—Southern Coke, No. 1, $15.75@$16.00; Southern Coke, No. 2, $15.00@$15.75; Southern Coke, No. 3, $14.25@$15.00; Southern Charcoal, No. 1, $18.00@$19.00; Southern Charcoal, No. 2, $17.00@$18.00; Missouri Charcoal, No. 1, $16.00@$16.50; Missouri Charcoal, No. 2, $15.00@$16.00; Ohio Softeners, $18 00@21 00. Forge.—Mottled, $13.00@$14.50; Missouri, $14.50@$15.00.—Car Wheel and Malleable Irons.—Lake Superior, $20 00@22 00; Southern, $20 00@24 00; Connellsville Coke, East St. Louis, $4 70; St. Louis, $4 85.

TO FIND the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. (Approximately every foot of elevation is considered equal to ½ lb. pressure per square inch.)

TO FIND the area of a triangle, multiply the base by one-half of the hight.

ENGINE ECONOMY.

Milling Engineer.

We have, on several occasions, compared the ecocomic performance of Corliss engines with those of the high speed type, and have given figures in support of the statement that engines of the Corliss type were the most economical, and where a permanent power plant was being put in, were by far the cheapest in the long run. Two or three instances of late, all from electric lighting stations, where the conditions are claimed to be most favorable to high speed engines, furnish additional proof of the correctness of our position. One is reported by Jno. W. Hill, the well known expert, where two high speed engines, driving an electric lighting station, used from 57 to 111 pounds of steam per indicated horse power per hour. This did not include the work of feeding the boilers, which was done by a steam pump supplied with steam from a separate boiler. Another instance was from a station using a single piston valve high speed engine, where the steam consumption reached 49 pounds per horse power per hour. The last instance is from a large electric lighting station using a large number of high speed engines of medium power, where an expert test showed a steam consumption from about 55 to 117 pounds per horse power per hour.

In the above cases the engines were running noncondensing, and when it is stated that a good Corliss engine, running non-condensing, will develop an indicated horse power per hour with a consumption of not to exceed 26 pounds of steam, some idea may be formed of the waste incurred in running the inferior types of machines.

As still further illustrating the difference in economy between the two types, we may mention a test made some few weeks since at the insane asylum at Wauwatosa, Wis. In the power plant are two engines, one a high speed and the other a Corliss, arranged so that either engine can be used to drive the electric light plant and other work. Owing to the arrangement of the plant, it was impossible to separate the steam supply of the engines from that required for heating and other purposes about the buildings, but both engines were tested, one one night and the other the next night, under exactly similar conditions. The results are as follows:

HIGH SPEED ENGINE.

Average indicated horse power	36.12
Total coal consumed in 15 hours	10,750 pounds.
Coal per indicated horse-power per hour for all purposes	19.84 pounds.

CORLISS ENGINE.

Average indicated horse-power	34.07
Total coal consumed in 15 hours	6,060 pounds.
Coal per indicated horse-power per hour for all purposes	11.85 pounds.

Repeated tests have shown that with the Corliss engine it will not require to exceed 3½ pounds of coal per horse-power per hour, but to make all reasonable allowance it may be stated at 4½ pounds per hour in this case. This would leave the amount of coal required for other work 3,781 pounds. Deducting this from 10,750 pounds, leaves 6,969 pounds of coal to be charged to the high-speed engine, or 12.8 pounds of coal per indicated horse-power per hour.

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Gong. Nichols	dis 40
Gong, Barton's	dis 40&10@50
Cow, western	Sargent's List 70&10
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" " brick	$15.50 20

Borax.

₱ lb	9½c&10

Boring Machines.

Without augers.	Upright	Angular
Snell's. Rice's patent	5 50	6 75 dis 40&10&10
Lawrence	5 50	6 75 dis 40@10&10
Other machines	2 35	2 75 net
Phillips, with augers	7 00	7 50 net

Braces.

Barber's	discount 50
Spoffard's Patent	discount 50&10
Bartholomew's Nos. 25, 27, 30	dis 50&10@60&5
Bartholomew's Nos. 117. 118, 119	dis 70@70&5
Amidon's corner brace	dis 40@40&10
Pecks	dis 66

Brackets.

Shelf, plain, Sargent's list	55&10@35&10&10
Fancy " "	dis 60&10@60 &10&10
Reading, plain	dis 50&10@60&1 &5
Reading, rosette	dis 60&10@60&10&10

Bright Wire Goods.

Regular List	87½@87½&10

Broilers.—Henis' self basting.

Inch	9	10	9x11
Per doz	$4 50	5 50	6 50

Buckets, Galvanized.

Iron clad 10 qt $2 75; 12 qt $3 00; 14 qt $4 25	

Bull Rings.

Humason, Beckley & Co.'s	dis 70
Peck, Stow & W. Co.'s	dis 50&10@50&10&10
Ellrich Hardware Co., white metal low list	dis 50@50&10

Butts.

	Discount
Wrough. brass	70@70&10
Cast brass, loose joint	33⅓&10
Cast Iron—	
Fast joint, narrow	50&10
Fast joint, broad	55&10
Loose joint	70&10
Loose joint, jap	70&10
Loose joint, jap. with acorns	70&10
Loose pin, acorns	70&10
Loose pin. japanned acorns	70&10
Loose pin.acorns.japanned, plated tips	70&10
Wrought steel—	
Wrought. fast joint narrow.	70&10
Wrought. fast joint broad	70&10
Wro't loose joint broad	70&10
Table Butts. back flaps, etc.	70&10
Regular inside blind	70&10
Light inside blind	70&10
Loose pin	70&10
Light loose pin	70&10

Can Openers.

Sprague No. 1 $2.00, 2 $2.25, 3 $2.50	dis 50&10&10
Star	$2 75 per doz
Domestic	₱ doz $2 50, dis 45
National	$1 25, dis 45

Caps—Percussion, ₱ 1000.

Hicks & Goldmark's	dis. 2½@25&7½
F. L. Waterproof, 1-10's	50c
E. B. Trimmed Edge, 1-10's	65c
E. B. Ground Edge, Cent. Fire, 1-10's	70c
Double Waterproof. 1-10's	1.40
Musket Waterproof, 1-10's	50c
G. D.	28
Elys waterproof central-fire	$1.60
Elys E. B	54c & 55c

Cartridges.

Rim fire	discount 50&5&2
Pistol and rifle	discount 25&5&2
Military and sporting	discount 15&5&2

Carpet Stretchers.

Cast steel, polished	₱ doz $2.25
Cast iron, steel points	per doz80c
Socket	₱ doz $1 75
Bullard's	dis25@25&10

Cattle Leaders.

Humason, Beckley & Co.'s	dis 70
Sargent's	dis 66⅔&10
Peck, Stow & W. Co	dis 50&10

Carpet Sweepers.

Queen	₱ doz $16.00
Mystic	₱ doz $16
Cottage	₱ doz $15
Queen. with band	₱ doz $18
King	₱ doz $30
Garland	₱ doz $18

Cards.

Horse and Curry	dis 10&10@10&10&10

Casters.

Bed, Plate, Shallow Socket	New List Brass, dis 55@55&5
Deep Socket	dis 40&10
Yale Casters. list May, 1884	dis 30 &10@40
Martin's patent	dis 45&10&50

Chains.

Trace. 6½ 10-2	₱ pair 1.03
Trace, 6½-10-3	₱ pair 92c
Trace, 7-10-2	₱ pair 1.11
	50&1 @50&10&5
German Halter Chain, list June, 1887	dis 50&10
German Coil. list of June, 1887	dis 50&10&5@60
Galvanized Pump Chain	₱ lb 5½&6c
Jack Chain, Iron	75@75&5
Jack Chain, Brass	dis70@70&5

Chalk.

White	₱ gross 50c
White Crayon	₱ gross 12@12½ dis 10
Red	70c
Blue	85c

Chisels.

Socket Framing. and Frmer.	dis 75&5@ 75& 10
Socket Framing and Firmer. Buck. Bros.	dis 20
Socket Firmer & Framing. L. & I. J. White	dis 30@30&5
Tanged Firmers	dis 40&10

Clamps.

Snow's adjustable, iron	dis 40&5
Hammer's adjustable, iron	dis 15
Sargent's cabinet, iron	dis 66⅔&10

Clips.

Axle and spring bar, Norway iron	dis 55&5&5
Wrought-Iron felloe clips	₱ lb. 5½c
Steel felloe clips	₱ lb5c

Cockeyes.

discount	50

Cocks, Brass.

Hardware list	dis40&10&2

Coffee Mills.

Enterprise	20 & 10@30

Compasses, Dividers, &c.

Compasses	dis 70@70&10
Calipers	dis 70@70&10
Dividers	dis 70@70&10
Bemis & Call Co.'s Dividers	dis 60&5
Bemis & Call Co.'s Compasses & Calipers	dis 50&5
Bemis & Call Co.'s Wing & Inside or Outside	dis 50&5
Bemis & Call Co.'s Double	dis 60
Bemis & Call Co.'s (Call's Patent Inside)	dis 30
Excelsior	dis 50
Cook's Extension	dis25
J. Stevens & Co.'s Calipers and Dividers	dis 25&10

Coopers' Tools.

Bradley's	discount 20
Barton's	discount 20@20&5
L. & I. J. White	20 & 5

Corkscrews.

Humason, Beckley Mfg. Co	dis 40@40&10
Clough's patent	dis 33⅓@33⅓&5

Corn Knives.

Clipper	2.00
X. L. C. R.	4.50
Russetts	6.50

Cradles.

Grain	dis 50&2

Crowbars.

Cast steel	₱ lb 4
Iron, steel points	3½

Curry Combs.

Fitch's Pattern	dis 50&10@50&10&10
Rubber	₱ doz. $10.00, dis 20

Cutlery.

Table	net
Excelsior Pocket	net

Dog Collars.

Embossed gilt	dis 30&10
Leather	dis 40

Door Springs.

Torrey's Rod, regular size	₱ doz $1.30
Gen. (Coil); list April 19, 1886	dis 10

Drawing Knives.

Douglass & Middletown	dis75@75&5
L. & I. J. White	dis 20 &5
Adjustable handle	dis 25@33⅓

Drills and Drill Stocks.

Blacksmiths' each	1.75
Blacksmiths' self-feeding, each	$7.50 discount 20
Breast, P. S. & W	discount 40 & 10
Breast, Millers Falls	each, $3.00 dis25
Ratchet, Weston's	20@25
Automatic Boring Tools	each, $1.75 @ $1.85
Twist drills	50&10&5
Morse	50&10&5
Syracuse	50&10&5
Standard	50&10&5
Cleveland	50&10&5

Drill Chucks.

Morse's Beach Patent	each, $8.00, discount 20
Standard	dis. 25

Dripping Pans.

Sheet Iron	large sizes 6¾c
Sheet Iron	small sizes 6¼c

Egg Beaters.

Dover	per doz. $2.00
Rival (Standard Co)	per gross $12.00

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour. CF F. FF.
Kegs, ₱ lb	4 c	5 c	2¾c
½ kegs, ₱ lb	4¼c	5¼c	2¾c
¼ kegs, ₱ lb	4½c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10lb cans, less than 10	10 c	10 c	7½c

Escutcheon Pins.

Iron, List Nov. 11, 1885	dis 50&10@50&10&5
Brass	60@60&5

Escutcheons.

Door Lock	Same discounts as Door Locks
Brass Thread	dis 60@60&10
Wood	dis 25

Files.

Rothery	40
Nicholson	60&5@60&10
Black Diamond	60&10
Royal	75
Heller's horse shoe rasp	dis 50& 7½@20&10

Faucets.

Frary's Patent Petroleum	dis 40&5&2
First Quality, Cork Lined	7 &5@7 &10
Self-measuring, Enterprise. per doz $50	dis 20&10

Fly Traps.

Paragon	₱ doz $1.75

Forks.

Hay, Manure and Spading Also list	dis 65

Fruit and Jelly Presses.

Enterprise Mfg. Co	dis 20&10@30

Fry Pans.

Central Stamping Co.'s low list	dis 65&10

No	0	1	2	3	4	5	6	7	8
₱ doz.	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00

Fluting Scissors.

Discount	45

Fluting Machines.

Eagle 3½ inch	$2.15, dis 35
Geneva Hand Fluter. White Metal. ₱ doz. 12.00	dis 25
Shepard hand. Nos. 85 $15.30. 95 $8. 110 $11	dis 40
Knox, 4½ inch rolls	$3 25 each dis 35
Knox, 6 inch rolls	$3 60 each dis 35
Crown, 4½ in. $3 50; 6-in. $4 00; 8-in. $6 50 each	dis 35
Crown Jewel	6-in. $3 50 each, dis 35
American. 5-in. $3; 6-in. $3 40; 7-in. $4 50 each	dis 35
Crown hand fluter, Nos. 1 $15; 2, $12 50; 3, $10 ₱ doz	dis 30

Gauges.

Marking	dis 60&10
Wire	dis 10&10

Gimlets.

Nail and Spike	dis 50&10&5
Double Cut, low list	25
"Bee"	₱ gross $12. dis 25@25&5

Glue Pots.

Tin enameled	dis 40&5@40&10
Family, Handy	dis 50

Grindstone Fixtures.

Sargent's	dis70&10

Gun Wads.

U. M. C. & W. R. A.—B. E., 11up	2 00
U. M. C. & W. R. A.—B. E., 9&10	2 30
U. M. C. & W. R. A.—B. E., 7&8	2 60
U. M. C. & W. R. A.—P. E., 11up	3 10
U. M. C. & W. R. A.—P. E., 9&10	4 00
U. M. C. & W. R. A.—P. E., 7&8	4 90
	dis 20&2
Eley's B. E., 11 up	1 75
Eley's P. E., 11@20	2 80

Hack Saws.

Griffin's Hack Saws, complete	dis 40&10@50
Griffin's Hack Saw, Blades only	dis 40&10@50
Diamond Hack Saws and Blades	dis 25

Halters.

Jute horse and cattle ties	$13.50 gro. net.

Hammers.

Maydole &	discount 25@25&10
Atha new list, Jan 15, 1887	dis 50@50&10
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75	dis 20&10
Heavy hammers and sledges under 5 lbs. 35c. over 5lbs, 30 c, new list	65&10@70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs. $15 ₱ doz	dis 10
Providence Tool Co., leg irons $25 ₱ doz	dis 10
Tower's	dis 33

Handles—Door or Thumb Latches.

Per doz	Nos. 0	1 0	1	1 8	2	3	4	
Sargent's	90	1 00	1 18	1 35	1 50	dis 60&1	&10	
Roggin's Latches						₱ doz. 30@50c		
Bronze Lion Drop Latches						₱ doz. 70c net		
Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88								net
Barn door						₱ doz $1 40, dis	0&10	
Wrought chest						dis 50&10	&10	
Surface chest						dis 70		
Flush chest						dis 70		
Lifting						dis 70		
Saw and plane						dis40&10@40&10&5		
Hammer and hatchet						dis 40		
Brad awl						₱ gross $2		
Hickory firmer chisel, assort						₱ gross $4 50		
Hickory firmer chisel, large						₱ gross $5 00		
Apple firmer chisel, assorted						₱ gross $5 00		
Apple firmer chisel, large						₱ gross $6 00		
Socket firmer chisel, assorted						₱ gross $3 00		
Socket framing chisel, assort						₱ gross $5 00		
File, assorted						₱ gross $2 75		
Auger, assorted						₱ gross $5 00		40@40 &10
Auger, large						₱ gross $7 00		

dis 40

Hangers.

Barn Door. old patterns	dis 60&10 &10@ 0
Climax (Anti-Friction)	dis 70
Star	dis 40&10@40&10&5
Scranton	dis 40
Kidder's	dis 50&10@60
Terry's Patent. 5 in. 12.00; 4 in., 10.00.	dis 50&5&2
Paragon	dis 40&10
Richards	dis 30@30&10

Harness Snaps.

German, new list	dis 40&10
Covert, New Patent. new list	dis 50&5&2

Hay Knives.

Lightning	per doz. $ 8 00 dis 25
Electric	₱ doz $17.00 dis 30

Hinges.

Wrought Strap and T Hinges	70&10&5@70&10&10
Screw, hook and strap. 6 to 12 in	3¾
14 to 20 in	5¼
22 to 36 in	2¾
Screw hoop & eye hinges. ½	₱ doz 1.50
⅝	2.45
¾	3.80 dis 10
Gate, western	₱ doz $4 40, dis 60
Gate, N. E.	₱ doz $7 00, dis 55
Gate. N. E. reversible	₱ doz $5 20, dis 55&10
Gate. Clark's. Nos. 1. 2. 3	dis60&10&5
Gate. N. Y. State	₱ doz $5 00. dis 55&10
Gate, automatic	₱ doz $12 50. dis 50
Gate, common sense	₱ doz pair $4 50, dis 50
Gate, Shepard's	dis 60&10&5

Hollow-Ware.

Stove Hollow-Ware. Ground dis	60&5@60&10
" " Unground	60&10&10@70
Enameled Kettles	dis 70@70&5
Saucepans	dis 40@40&5

Galvanized Tea-Kettles	Inch	6	7	8	9
	Each	55	60	65	75

Hoes.

Garden, mortar	dis 65
Planter's. cot	dis 65
Canton	dis 65

Hog Rings and Ringers.

Hill's rings	$2 25@$2 40
" ringers	Old Style $3 00; Improved $4 50
Blair hog ringers	₱ doz $2 00@$2.50

Hooks.

Bird Cage. Sargent's list	dis 60&10&10
Belt	dis 75&10@80
Clothes Line Sargent's list	dis 60&10&10
Ceiling Sargent's list	dis 55&10&10
Coat and Hat. Sargent's list	dis 55&10@60&10
Wire Coat and Hat. Gem	dis 45
Wrought Staples and Hooks & Staples. list Jan 12. 1887	dis80&20
Wire Screw Hooks and Screw Eyes.	dis 75&10
Hooks and Eyes—Malleable Iron	dis 70@70&10
Hooks and Eyes—Brass	dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable. ₱ lb	23	24	25	26	28	dis25&10to25&10&10
Putnam. ₱ lb	18	19	20	21	23	dis 15
Essex						25&10@25&10&10

Horse Shoes.

Burden, at factory	₱ keg $4.00
R. I. Horse Shoe Co., Perkins' Imp. at factory	₱ keg $4 00
Mule Shoes, at factory	₱ keg $5.00

Hose, Rubber, Boston Belting Co's.

Standard	70@70&10
Extra	60@ 0&10
Best	45&10

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd	₱ doz. $3.00, dis 20

Ice Cream Freezers.

American	50&10
Gem	55&10
Crown	50&10

Ice Tongs.

Champion	₱ doz $4.00, dis 25&10
Family	₱ doz $2.75, dis 20@25

Jack Screws.

Illinois Bolt Co. list	dis 70

Kettles.

	Spun.	Stamped.
Brass. 7 to 17 inches inclusive	24	21
Brass larger than 17 inches	26	23½
Enameled and Tea Kettles	See Hollow Ware	

Keys.

Eagle, cabinet, trunk and padlock	dis 33⅓&2

Knives.

Russell's Butcher	net
Moran's Shoe Knives	dis 20

Knobs.

Carriage. Japanned	₱ gross 80c. dis 60&10
Base, Rubber Tip	dis 70&10&5
Hemacite Door Knobs. new list	dis 40@10@50
Door Mineral	65c@8c
Door Por. Jap'd	75c@78c
Door Por. Nickle	2 00@2 25
Door Por. Plated	2 00@2 25

Ladles.

Melting, Sargent's	dis 55&10
Melting, Monroe's Patent.	₱ doz $4.00 dis 40
Melting, P. S. & W	dis 35&10@40

Lanterns.

Tubular No. 0	$4.50 per doz
" " 1	6 50
Tubular. Lift Wire. No. 0,	₱ doz 6 00
Tubular. Lift Wire. No. 1.	₱ doz 7 00
Police. Small. $6.00; Med.. $7.25; Large. $9.75	dis20@25

Classified List of Advertisers.

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) irregularly.

PAGE.

Bolts and Nuts—
Hotchkiss & Upson Co., Cleveland, O..... 10
Colwell & Collins Norway Bolt Co., Cleveland, O..... 10

Brick and Tile Machines—
Frey, Sheckler & Hoover, Bucyrus, O 18
*Stevenson & Co., Wellsville, O..... 1

Bicycles and Tricycles—
A. W. Gump & Co., Dayton, O..... 19

Babbitt Metal—
Fay Manufacturing Co., Elyria, O..... 16

Belt Holders—
*W. R. Santley & Co., Wellington, O..... 2

Boilers—
Smith & Teachout, Cleveland, O.....1 & 10
J. C. McNeil Co., Akron, O..... 10
Mansfield Steam Boiler Works Mansfield, O..... 10
Reeves Bros., Niles, O.....2 & 10
Sharon Boiler Works, Sharon Pa..... 2
Enterprise Boiler Co, Youngstown, O..... 20
Lane, Bodley & Co, Cincinnati, O..... 20
John T. Caulfield, Richmond, Ind..... 2

Bevel Jig Mills—
C. J. McNutt, Ashtabula, O..... 20

Books—
Cleveland Printing & Publishing Co., Cleveland, O..... 16
Rand, McNally & Co., Chicago and New York..... 12
Seeger & Guernsey Co., New York..... 17

Coal and Coke——
Pittsburgh & Wheeling Coal Co., Cleveland, O..... 10

Catalogues—
Cleveland Printing & Publishing Co., Cleveland O.....14 & 18

Coal Screens—
*Forest City Wire & Iron Works Cleveland, O..... 1

Cranes and Derricks—
Phœnix Iron Works, Cleveland, O..... 19
McMyler Manufacturing Co., Cleveland, O. 18
Wm Tod & Co., Youngstown, O..... 20

Car Wheels—
Bowler & Co., Cleveland, O..... 20
Cleveland Wheel & Foundry Works, Cleveland, O..... 18

Chemical Laboratory—
J. F. Elsom, New Albany, Ind..... 10

Cutters—
Brown & Sharpe Mfg. Co, Providence, R.I. 20

Damper Regulators—
*Curtis Regulator Co., Boston, Mass..... 8

Drilling Machines—
Bickford Drill Co, Cincinnati, O..... 1
Universal Radial Drill Co., Cincinnati, O... 1
Lodge, Davis & Co., Cincinnati, O..... 19
*E. A. Schumacher, Cincinnati, O..... 10

Engineers and Contractors—
E. H. Jones & Co. Cleveland, O..... 1
Jas. P. Witherow, Pittsburgh, Pa..... 2
Alex. Laughlin & Co., Cleveland, O..... 2
McClure & Schuler, Pittsburgh, Pa..... 2

Elevators—
L. S. Graves & Co., Rochester, N. Y..... 2

Explosives—
Hercules Powder Co., Cleveland, O..... 12

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago, Ill..... 1

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co., Cleveland, O..... 2

Engines (Steam)—
Kilby Manufacturing Co., Cleveland, O..... 1
Novelty Iron Works, Canton, O..... 10
Aetna Machine Co., Warren, O..... 18
C. & G. Cooper Co., Mt. Vernon, O..... 20
Lloyd & Sterret, Erie, Pa..... 19
Wm. Tod & Co., Youngstown, O..... 20
Lane & Bodley Co., Cincinnati, O..... 20
E. E. Cline, Alliance, O..... 20
E. H. Jones & Co., Cleveland..... 1
*Columbus Machine Co., Columbus, O 8
*Chandler & Taylor Co., Indianapolis, Ind.. 2
Buckeye Engine Co., Salem, O..... 18

Engines (Gas)—
Schleicher, Schumm & Co., Philadelphia, Pa., and Chicago, Ill..... 19

Engineers' Specialties—
Crescent Manufacturing Co., Cleveland, O.. 14
*Curtis Regulator Co., Boston, Mass..... 8
Harlow Lubricator Mfg. Co., Boston, Mass.. 2
Cleveland Flue Cleaner Co., Cleveland..... 14

Forges—
Cleveland City Forge & Iron Co, Cleveland, O..... 1

Foundries—
Bowler & Co., Cleveland, O.....10 & 20
Taylor & Boggis Foundry Co., Cleveland, O. 10
Wm. Fitzsimmons & Son, Cleveland, O..... 10
Curry & Co. Meadville, Pa..... 10
Cleveland Wheel & Foundry Works, Cleveland, O..... 18

For Sale—
Foundries, Furnaces, Machinery, etc ....10 & 14

Flue Cleaners—
Cleveland Flue Cleaner Co., Cleveland, O... 14
Crescent Manufacturing Co., Cleveland..... 14

Files—
Industry File Works, Cleveland, O..... 10

Feed Water Heaters—
Stilwell & Bierce Manufcturing Co., Dayton, O..... 1
Laidlaw & Dunn Co, Cincinnati, O..... 18
W. C Armstrong & Co., Springfield, O..... 19
Hoppes Manufacturing Co., Springfield, O... 20
E. H. Jones & Co., Cleveland..... 1

Foundry Cupolas—
Victor Colliau, Detroit, Mich..... 10

Frost Proof Steam Traps—
*Curt's Regulator Co., Boston, Mass..... 8

Foot Rules—
Cleveland Printing & Publishing Co., Cleveland, O..... 20

Foundry Supplies—
J. D. Smith & Co., Cincinnati, O..... 10

Governors—
Leonard & McCoy, New York..... 2

Harness and Carriage Hardware—
Geo. F Eberhard Co., Akron, O..... 10

Hardware—
Wm. Bingham Co., Cleveland, O.....10 & 19
Eberhard Manufacturing Co., Cleveland, O. 10

Ice Cream Freezers—
Kingery Mfg. Co., Cincinnati, O..... 20

Injectors—
Columbia Injector Co., Cleveland, O..... 2

Insurance Policy Registers—
Cleveland Printing & Publishing Co., Cleveland, O..... 12

Iron Roofing—
Sykes Iron Roofing Co., Niles, O..... 12
Cambridge Iron Roofing Co., Cambridge, O. 1
Garry Iron Roofing Co., Cleveland, O..... 17
Standard Iron Co., Bridgeport, O..... 10

Iron Ore and Pig Iron—
Dalliba, Corrigan & Co., Cleveland, O..... 10
Tuttle, Oglebay & Co., Cleveland, O..... 10
J. H Outhwaite & Co., Cleveland, O..... 10
Pickands, Mather & Co., Cleveland, O..... 10

Iron Lime Kilns—
Fred Kranz, Sandusky, O..... 19

Iron Planers—
Smith & Silk, Cincinnati, O..... 20

Lumber—
Fisher & Wilson Co., Cleveland, O.....10 & 12
Martin & Barris, Cleveland, O..... 10

Lathes—
Muller Machine Co., Cincinnati, O..... 12
Sebastian, May & Co., Cincinnati, O..... 19
Lodge, Davis & Co., Cincinnati, O..... 20
H. L. Shepard, Cincinnati, O..... 19

Mining Machinery—
American Manufacturing, Mining & Milling Co., Cleveland, O..... 20
Webster, Camp & Lane Machine Co., Akron, O..... 10

Machinery (General)—
Machinery Manufacturers' Association, Cleveland, O..... 1
Lane & Bodley Co., Cincinnati, O..... 20
Lord, Bowler & Co., Cleveveland..... 10
*Columbus Machine Co., Columbus, O..... 8

Machine Shops—
Webster, Camp & Lane Machine Co., Akron, O..... 10
Novelty Iron Works, Canton, O..... 10

Machinists' Tools—
E. E. Garvin & Co., New York..... 19

Patents—
M. D. & L. L. Leggett, Cleveland, O..... 1
Jos. A. Osborne, Cleveland, O..... 2
H. T. Fisher, Cleveland, O..... 19
*Thomas P. Simpson, Washington, D. C..... 14

Pumps (Steam)—
John H. McGowan & Co., Cincinnati, O..... 2
Hughes Steam Pump Co., Cleveland, O..... 2
Laidlaw & Dunn Co., Cincinnati, O..... 18
E. H. Jones & Co., Cleveland..... 1

Pumps (Chain)—
S. E Crawford, Norwalk, O..... 19

Pig and Bar Iron—
Condit, Fuller & Co., Cleveland, O..... 10
Cleveland Rolling Mill Co., Cleveland, O.... 10
W. F. Jarvis & Co., Detroit, Mich..... 19
Hussey & Pomeroy, Cleveland, O..... 10

Paint—
Iron Clad Paint Co., Cleveland, O..... 17

Pipe Coverings—
John A. McConnell & Co., Pittsburgh, Pa... 16

Punching and Shearing Machines—
*Bertch & Co., Cambridge City, Ind..... 1

Railway Supplies—
Bowler & Co., Cleveland, O.....10 & 20
Cleveland City Forge & Iron Co., Cleveland, O..... 1
Cleveland Wheel & Foundry Works, Cleveland, O..... 18

Railroads—
Time Tables, etc..... 16

Reducing Valves—
*Curtis Regulator Co., Boston, Mass..... 8

Steel Pens—
Ivison, Blakeman, Taylor & Co., New York. 19

Signs—
Weber & Lind Sign Works, Cleveland, O.... 19

Steam Heating Apparatus—
*Curtis Regulator Co., Boston, Mass..... 8
A. A. Griffing Iron Co., Jersey City, N. J..... 2

Stoves—
Taplin, Rice & Co., Akron, O..... 10
Cleveland Co-Operative Stove Co., Cleveland, O..... 17

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Ct..... 2

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co, Cleveland, O.... 10
W. F. Thornton, Cleveland, O..... 10

Safety Water Columns—
Reliance Gauge Co., Cleveland, O..... 10

Saws—
E. C Atkins & Co., Indianapolis, Ind..... 1

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland, O..... 10

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland, O.... 10
Summers Bros, Struthers, O..... 10

Sheet Steel—
Standard Iron Co., Bridgeport, O..... 10

Steel Castings—
Chester Steel Casting Co., Philadelphia, Pa. 19

Steam Fitters' Supplies—
Worswick Manufacturing Co., Cleveland, O..... 18

Tool Holders—
Walker Manufacturing Co., Cleveland, O... 14

Turnbuckles—
Cleveland City Forge & Iron Co, Cleveland, O..... 1

Washing Machines—
Horton Manu'f'g Co., Ft. Wayne, Ind..... 19

Wire Goods—
F. Powell & Co., Toledo, O..... 1
W. S. Tyler Wire Goods Co., Cleveland, O... 2
‡Sedgwick Bros., Richmond, Ind..... 14

Wire Machinery—
John Adt & Son, New Haven, Ct..... 19

INDEX TO ADVERTISERS.

A
Ætna Machine Co., Warren, O..... 18
Armstrong, W. C. & Co., Springfield, O..... 20
American Manufacturing, Mining & Milling Co., Cleveland..... 20
Atkins, E. C. & Co., Indianapolis, Ind..... 1
Adt, John & Son, New Haven, Conn..... 19

B
Bowler & Co., Cleveland.....10 & 20
Bingham, Wm. & Co, Cleveland.....10 & 19
Bickford Drill Co., Cincinnati, O..... 1
*Bertch & Co., Cambridge City, Ind..... 1
Buckeye Engine Co., Salem, O..... 18
Brown & Sharpe Mfg. Co., Providence, R. I... 20

C
Colwell & Collins Norway Bolt Co., Cleveland. 10
Caulfield, John T., Richmond, Ind..... 12
Cleveland Prt'g & Pub'g Co., Cleveland...2 & 14
Cleveland Wheel & Foundry Works, Cleveland..... 18
Canton Well Driller Co., Canton, O..... 14
Cooper, C & G. Co., Mt. Vernon, O..... 19
Crescent Manufacturing Co., Cleveland..... 14
Curry & Co., Meadville, Pa..... 10
Cleveland Flue Cleaner Co., Cleveland..... 14
Cambridge Iron Roofing Co., Cambridge, O.... 20
Crawford, S. E., Norwalk, O..... 19
Condit, Fuller & Co., Cleveland..... 10
Cleveland Rolling Mill Co, Cleveland..... 10
Cleveland City Forge & Iron Co., Cleveland... 1
Cleveland Co-operative Stove Co., Cleveland. 17
Chester Steel Casting Co., Chester, Pa..... 19
Cline, E. E. Alliance, O..... 20
*Curtis Regulator Co., Boston, Mass..... 8
*Columbus Machine Co., Columbus, O..... 8
Columbia Injector Co., Cleveland, O..... 2
*Chandler & Taylor Co., Indianapolis, Ind..... 2
Colliau, Victor, Detroit, Mich..... 10

D
Dalliba, Corrigan & Co., Cleveland..... 10

E
Enterprise Boiler Co., Youngstown, O..... 20
Eclipse Electrotype & Engraving Co., Cleveland..... 2
Eberhardt Manufacturing Co., Cleveland..... 10
Eberhard Geo. F. Co., Akron O..... 10
Elsom J F., New Albany, Ind..... 10

F
Frey, Sheckler & Hoover, Bucyrus, O..... 18
Fay Manufacturing Co., Elyria, O..... 2
*Forest City Wire & Iron Works, Cleveland... 1
Fisher & Wilson Co, Cleveland.....10 & 18
Fisher, H. T., Cleveland..... 19
Fleharty, J. H. & Co., Cleveland..... 10

G
Gump, A. W. & Co., Dayton, O..... 19
Garry Iron Roofing Co. Cleveland..... 2
Graves, L. S. & Co., Rochester, N. Y..... 2
Garvin, E. E. & Co., New York..... 19
Griffing Iron Co, A. A., Jersey City, N. J..... 2

H
Hotchkiss & Upson Co., Cleveland..... 10
Hercules Powder Co., Cleveland..... 12
Hoppes Manufacturing Co., Springfield, O..... 20
Hughes Bros. Steam Pump Co., Cleveland..... 2
Hussey & Pomeroy, Cleveland..... 10
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn..... 2
Horton Manufacturing Co., Ft. Wayne, Ind.. 19
Harlow Lubricator Mfg. Co., Boston, Mass..... 2

I
Industry File Works, Cleveland..... 10
Iron Clad Paint Co., Cleveland..... 17
Ivison, Blakeman, Taylor & Co., New York.. 19

J
Jarvis, W. F. & Co., Detroit, Mich..... 10
Jones, E. H. & Co., Cleveland..... 1

K
Kilby Manufacturing Co., Cleveland..... 1
Kranz, Fred, Sandusky, O..... 19
Kingery Mfg Co., Cincinnati, O..... 20

L
Leggett, M D. & L. L., Cleveland..... 1
Lane, Bodley & Co., Cincinnati, O..... 20
Lodge, Davis & Co., Cincinnati, O..... 19
Laughlin, Alex. & Co., Cleveland..... 2
Lloyd & Sterrett, Erie, Pa..... 19
Laidlaw & Dunn, Cincinnati, O..... 18
Leonard & McCoy, New York..... 2

M
McNeil, J. C. Co., Akron, O..... 10
Mansfield Steam Boiler Works, Mansfield, O.. 10
McNutt, C. J., Ashtabula, O..... 20
McMyler Manufacturing Co., Cleveland..... 18
Martin & Barris, Cleveland..... 10
Muller Machine Co., Cincinnati, O..... 10
Machinery Manufacturers' Association, Cleveland..... 1
McGowan, John H. Co., Cincinnati, O..... 2
McConnell, John A. & Co., Pittsburgh, Pa..... 16
McClure & Schuler, Pittsburgh, Pa..... 2

N
Novelty Iron Works, Canton, O..... 10

O
Outhwaite, J. H. & Co., Cleveland..... 10
Osborne, J. A., Cleveland..... 2

P
Pittsburgh & Wheeling Coal Co., Cleveland... 10
Phœnix Iron Works, Cleveland..... 19
Powell, F. & Co., Toledo, O..... 1
Pickands, Mather & Co., Cleveland..... 10

R
Reeves Bros., Niles, O.....2 & 10
Reliance Gauge Co., Cleveland..... 10
Rand, McNally & Co., Chicago and New York 12

S
*Stevenson & Co., Wellsville, O..... 1
Smith & Teachout, Cleveland.....1 & 10
Sharon Boiler Works, Sharon, Pa..... 2
Schleicher, Schumm & Co., Philadelphia, Pa. and Chicago, Ill..... 19
Stilwell & Bierce Manufacturing Co., Dayton, O..... 1
Sykes Iron Roofing Co., Niles, O..... 12
Sebastian, May & Co., Cincinnati, O..... 19
Shepard, H. L., Cincinnati, O..... 19
Smith & Silk, Cincinnati, O..... 20
Sanger, A. L., Cleveland..... 10
Summers Bros. & Co., Struthers, O..... 10
Seeger & Guernsey Co., New York..... 17
Smith J. D. & Co., Cincinnati, O..... 10
*Schumacher E. A., Cincinnati, O..... 10
*Simpson, Thomas P. Washington, D. C..... 14
‡Sedgwick Bros., Richmond, Ind..... 14
*Santley, W. R. & Co., Wellington, O..... 2
Standard Iron Co., Bridgeport, O..... 10

T
Tod, Wm. & Co., Youngstown, O..... 20
Taylor & Boggis Foundry Co., Cleveland..... 10
Tuttle, Oglebay & Co., Cleveland..... 10
Taplin, Rice & Co., Akron, O..... 10
Thornton W. F., Cleveland..... 10
Tyler W. S. Wire Goods Co., Cleveland..... 2

U
Universal Radial Drill Co., Cincinnati, O..... 1

W
Witherow, J. P., Pittsburgh, Pa..... 2
Webster, Camp & Lane Machine Co., Akron, O. 10
Weber & Lind, Cleveland..... 19
Worswick Manufacturing Co., Cleveland..... 10
Walker Manufacturing Co., Cleveland..... 14

For Sale.

A 6"x10" SELF-INKING Foot Power Printing Press; will do good work. Address J. M., care Iron Trade Review, Cleveland, O. tf

For Sale.

ONE OF DUNN'S HOISTING MACHINES, with over 40 feet of chain. Good as new; capacity, 600 lbs. Address Dunn, care Iron Trade Review, Cleveland, O. tf

For Sale Cheap.

A NEW No. 4 INJECTOR, never been used. Address Jones, care Iron Trade Review, Cleveland, O. tf

For Sale and Wanted.

I HAVE ALWAYS FOR SALE New and Second Hand Iron and Steel Rails of every size, and am open to purchase same at all times. Address P. O. Box 940, Pittsburgh, Pa.

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We guarantee our A. & D. Flue Cleaners to give Steam the most perfect spiral motion entire length of tubes, and do the best work.

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The Crescent Lubricating Compound and Automatic Grease Cups will effect a saving of 75 per cent. over oil. Investigate their merits. CRESCENT MF'G. CO.,
24 CLEVELAND, O

Patents

THOMAS P. SIMPSON, Washington D. C. No att'y fee until patent obtained. Write for inventor's guide

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Cleveland Printing and Pub. Co
Cleveland, Ohio.

Locks, Bolts, etc.

P. & F. Corbear, Locks & Bronze Goods.

Door locks, knobs and latches.....dis 60
Escutcheons and keys .....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60
Lever bell pulls, genuine bronze.....dis 60&10
Butts, genuine bronze.....dis 60&10
Butts, bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges & flaps genuine bronze....dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze .....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull genuine bronze.....dis 66⅔
Letter box plates, genuine bronze.....dis 60&10
Barn door locks .....dis 33⅓

Lemon Squeezers.

Porcelain lined.....₱ doz $6 00, dis 25&30
Wood.....₱ doz $3 00. dis 3 5
The "Boss".....₱ doz $2.50
Dean's No. 1, ₱ doz $6 50: 2, $3 35;3, $1 90....dis
Little giant..... dis 50@50&5

Lines.

Cotton Chalk.....dis 55
Silver Lake, Braided, N 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross .....dis 25
Masons' Linen.....dis 45
Wire Clothes, No 18, $3.60; No 19, $3.00; No. 20 $2.50;.....

Mallets.

Hickory .....dis 20&10@20&10&10
Lignumvitæ.....dis 2(&10@.0&10&10
Penfield Block Co., Lignumvitæ and Hickory.....dis 30@30&10

Mattocks.

Regular list..... dis 60&10@60&10&5

Meat Cutters.

Dixon's (P.S.&W.)	1	2	3	4	
	₱ doz. $14.00	$17.00	$19.00	$30.00	dis 45
Draw Cut	Nos. 5	2	6	8	10
Each	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18dis 40

Hale's—Nos. 11 12 13
$27 $33 $45 dis 70@70&5

Enterprise.....dis 30

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Smith's, ₱ doz. single, $2 00; double, $3 00 dis 40@45

Money Drawers.

Tucker's ₱ doz.....$18 @20

Molasses Gates.

Stebbins' pat ..... dis 70@70&7½
Stebbins' genuine.....dis 60&10&10
Stebbins' tinned ends.....dis 40&10
Lincoln's pattern..... dis 70@70&10
Scoville.....$7 45&10

Nails (wire).

List July 14 1887.....dis 70&10
Standard Penny Nails, ₱ keg card rate
{ Car lots.....$2 45
{ Less than car lots, $2 55

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8	7	5½	4¼	4	3¾	3½
Hexagon.....	15½	11½	8½	6	5¾	5¼	5
Washers.....	9	8	7	5	4¾	4¼	4½

In lots less than 100 lbs, ₱ lb add ¼c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....₱ dos. $2 00, dis 10
Quakenbush.....$5 00 net

Oakum.

Government.....₱ lb 7¾@8c
U. S. Navy.....₱ lb6¾@7c
Navy .....₱ lb 5¾ @6¼c

Oilers.

Zinc and Tin.....dis 65@65&10
Brass and Copper.....dis 50&10@50&10&5
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co ..... dis 60
American Packing. .....10@11c
Russia Packing.....14c
Italian Packing.....1 @14c

Pencils.

Faber's Carpenters' .....high list, dis 50
Faber's Round Gilt.....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs.....$12 dis 60&10@60&10&5
... .. 6 to 7 lbs.....$13 dis 60&10@60&10&5

Pinking Irons.

₱ doz ..... 65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
rass head, combina' n list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

Sandusky Tool C ..... dis 30

Pliers and Nippers.

Button's Patent .....dis 30&10@40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21 00 ₱ Doz.....dis 20&10@33⅓
Gas Pliers. .....dis 60
Humason & Beckley .....dis 50@50&10
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10@70&10&10
Pocket levels.....dis 70&10@70&10&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ doz. $36.00, dis 25&10
Eureka Diggers ..... ₱ doz. $16.00 @ $17.00
Champion.....per doz $9.00
Vaughan's Hollow Tube Post Hole..$13.00@$14.00 dis40

Potato Parers.

White Mountain.....₱ doz $5.00@$5.50
An'rim Combination.....₱ doz $8.00
Hoosier .....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ doz $18.00.....dis 20&10
Disston's Pruning Hook....₱ doz $12.00 dis 20&10
Pruning Shears .....₱ doz 3.75@$4.00 net

Pulleys.

Hot House ..... discount 60&10
Japanned Screw..... discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 66⅔&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers....dis 60&10@60& 0&10
Pitcher spout, cheaper goods....dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality, 60@65c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners.....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....₱ lb 35c dis 15
Sliding Door, Iron, Painted.... ₱ ft 1c dis20&10&5

Rakes.

Cast Steel..... dis 65
Malleable .....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher..... $10@£...dis 10
Rifle Razor.....$9 50 net

Rivets.

Iron, Thousand, list November 17....dis 50@50&10
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 5C@50&10

Rods.

Stair, Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ... dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla, ½ inch and over.....14¼c
Sisal, ½ inch and over..... 12¼c

Rules.

Boxwood..... ..... discount 80&10@80&10&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs $2.40 @ $2.55
Self-heating.....₱ doz $9 net
Self-Heating, Tailor's.....₱ doz $18 net
Mrs. Potts's Irons. ..... dis 40@40&5
Enterprise Star Irons.....discount 40

Sash Weights.

Per ton $22

Saws.

Disston's Circular..... discount 45@45&5
Disston's hand panel, rip &c.....dis 25@25&5
W. M. & C., Champion Regular..per foot 2(@.6c
W. M. & C., " Thin Back..₱ ft 27@.9c

Saw Frames.

White, Vermont..... ₱ gross $3 00 @$10 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10@50

Scales.

Hatch, Counter, No. 171 .....₱ doz $21.00
Hatch, Tea, No. 161.....₱ doz $6.75@7 00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10@50&10&4

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....₱ doz $4.00, dis 10
Foot..... ..... dis 50&10@60

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 188.. Flat head iron..... dis 70 } Extra .10 often given
Round head iron..... dis 65
Flat head brass.....dis 65
Round head brass..... dis 60
Flat head bronze 65
Round head bronze..... 60
Machine, flat head, iron.....dis 55
Machine, round head, iron 50
Bench and hand—
Bench, iron ....55 &10@55&10&10
Bench, wood, beech, per dozen $2.25.....
Bench, wood, hickory.....20 & 10
Hand, wood.....25&10@25&10&5
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75
Bed.....25&5
Hand rail, ...66⅔&10

Saw Tools.

Atkins' patent.....₱ doz sets $6 00

Shears.

American (Cast) Iron.....dis 75&10@75&10&5
Pruning .....See Pruning Hooks and Shears
Garnard's Lamb Trimmers.....₱ doz $3.75
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&10@60&10&10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00.....dis 25
Rogers, complete, $4.00. .....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&20
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's.....dis 75
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&10&2

Ship Tools.

L, & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....60&10@60&10&5
Brass Head.....60&10&10

Sieves.

Metallic, new list.....dis 50&25&10
Flour sifters { Victor..... $2 00
Hunter..... $2 25
Comet..... $1 25

Slates.

School, by case..... dis 50&10

Spoke Shaves.

Iron.....dis 45
Wood .....dis 30

Spoke Trimmers.

Bonney's.....₱ doz $10.00 dis 50
Stearns'.....dis 20&10

Spoons.

Basting Spoons ..... dis 70&10
Britannia. .....dis 60
Rogers Bros. .....dis 50

Squares.

Steel and iron ..... } dis 75&10@80
Nickel plated..... }
Disston's try square and T bevels .....dis 45&10
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's .....dis 30&5
"Lightining" screw plate .....dis 25&5

Stone.

Hindostan, No. 1, 3c; Axe, 3¾c; Slips 5c
Washita Stone .....No. 1, ₱ lb 14&15c
Turkey Oil Stone.....4 to 3 in.....₱ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1.....₱ lb 30@32
Washita No 2 stone.....₱ lb 11@12c
Arkansas Stone 1.75

Stove Boards.

Zinc.....70
Oxidized.....45

Shovels and Spades.

Ames' list Nov 1 1885..... .....discount 20
Dennis.....5.25
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon's.....₱ gross $6 00 dis 10
Gem .....₱ gross 4 50 dis 10
Gold medal.....₱ gross 6 00 dis 25
Rising Sun.....₱ gross $5 50 net
Dixon's plumbago ....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering.....dis 15
Disston's Brick and Plastering... dis 25@25&10
Brade's brick..... dis 25

Tacks, Brads, &c.

New List, January 2, 1888.
American iron carpet tacks all kinds... 80@80&5
Steel carpet tacks all kinds..... 8 @80&5
Swedes Iron carpet tacks all kinds ..... 80@80&5
Swedes iron tacks..... 75& @75&10
Swedes iron Upholsterers' tacks..75&10@75&10&5
Tinned Swedes iron tacks.....7(&10@75&10&5
inned Swedes iron Upholsterers' tacks ... 75&10@ 75&10&5
American iron cut tacks .....75@75&10
Copper tacks .....50&10
Copper finishing and trunk nails.....50&10
Cigar box nails .....50&10@50&10&5
Finishing nails. .....70&10@ 0&10&10
Hungarian nails and miners' tacks.....70&10@70 &10&10
Gimp and lace tacks.....75&10@75&10&5
" " " tinned.....75&10@75& &5
Trunk and clout nails.....70&10@70&10&10
Tinned trunk and clout nails.....70&10@70&1 &10
Basket nails .....70&10@ 70&10&10
Chair nails .....70&10@70&10&10
Common and patent brads.....70&10@70&10&10
Tinned capped trunk nails... .....70&10@70&10&10

Tinware.

Stamped, Japaned & Pieced, list Jan 20, 1887..... .....dis 70@75&5

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35@40&5
Victor.....60&10
Wood, mouse.....₱ doz holes 11@12
Delusion, mouse.....₱ gross $18 00 dis 15

Transom Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls.....	21c&29c	
No. 18, " " ¼ and ½ "	18c&28c	
No. 36, " " ¼ and ½ "	16c&27c	
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine 11⅛		
3-Ply " 1 lb Balls.....	12&12½c	
3-Ply " 1½ lb Balls	11&11¼	
Cotton Wrapping, 5 Balls to lb.....	15@16c	

Vises.

Solid box.....60
Parker's..... discount 20@25
Prentiss..... " 20 &5@25
Stephen's..... " 25&30
Saw Filers, Wentworth's .....dis20&10
Saw filers, Stearn's ..... 33⅓&10@33⅓&10&10

Washer Cutters.

Smith's Patent .....₱ doz $12 00, dis 20&10&10
Johnson's.....₱ doz $11 00, dis 33⅓
Penny's.....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....₱ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.25; 10 in., $2.70; 12 in., $3.25

Wire. New List Jan. 18. 1884

Brass and Copper..... discount 20&25
Bright and annealed, Nos. 0 @18 ....dis70& 1)@75
" " Nos. 19 @ 26....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list..... .dis 70@7 &5
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18,..... dis 65
Cast steel .....dis 50
Tinned Broom Wire.....dis70&5@70&10
Annealed Fence, Nos. 8 and 9..... dis75
Annealed Grape, Nos. 10 to 14..... dis 75
Stubs Steel Wire regular.....$6 00.@lb dis30

Wrenches.

Coe's genuine, cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemis & Call's Combination.....dis 35
Donohue's Engineers'.....20&10

TINNERS' STOCK.

Tin.

Banca ..... } Prices on application.
Straits..... }
English ..... }
Bar..... }

Spelter.

American, cash, ₱ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets.....$6 00@6 25
IX 14x20 112 sheets..... 7 25@7 50
IC 10x14 225 sheets.....₱ box 5 75@6 00
IC 20x28 112 sheets.....12 00@12 50
IX 10x14 225 sheets ..... 7 25@7 50
IX 12x12 225 sheets ..... 7 50@7 75
For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only application.
No. 1, Refined..... }
Bingham..... }

Zinc.

in c, cask 6½
in c, open 7½

LEAD.

Pig..... } Quotations on application.
Bar ₱ lb..... }
Pipe ₱ lb..... }
Sheet, ₱ lb..... }
Chilled Shot ₱ bag 25 lbs..... }

BABBIT METAL.

No. 4..... 6
Allens..... 9¼
Excelsior..... 15
W. B. Genuine..... 25

COPPER.

Lake Ingot..... 18@18¼
Arizona..... 17½

IRON AND STEEL

Flat Bar

1¼ to 4 by ⅝ to 1 inch.....1 75
4½ to 6 by ⅝ to 1 inch.....1 85
1¾ to 6 by 1¼ to inch.....2 15
1¼ &1¾ by ⅜ to 1 85
1 &1¼ by ⅝ to ⅞.....1 85
⅝, ¾ and ⅞ by ⅜ o ⅝.....2 25

Round and Square.

1 to 1⅛ inch.....1 75
2 to 2⅝.....1 95
2¾ to 3¼ inches.....2 25
3⅜ to 4 .....2 75
4⅜ to 4½ 2 25
4¾ to 5 .....2 45

Oval.

⅜ to 1¼ inch.....2 15
⅝ to ¾ 2 35
⅞ .....
1 .....2 95

Half Oval and Half Round.

1¼ to 3 inch.....2 85
⅜ to 1¼ 2 45
⅝ to ¾ 2 95
⅞ 3 25
1 .....4 75

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch.....1 95
1 to 1⅝ by ¼ and 5-16 inch.....2 05
¾ to ⅞ by ½ and 5-16 inch.....2 25
⅝ to ⅞ by ¼ and 5-16 inch.....2 75

Hoops.

1¼ to 4, Nos. 13 to 15.....2 55
1¼ to 2, Nos. 16 to 18.....2 65
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....2 75
15-16, 1 and 1⅛, Nos. 16 to 18.....2 85
15-16, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 25
⅞, Nos. 13 to 15.....2 95
⅞, Nos. 16 to 18.....2 05
⅞, Nos. 19 and 20.....2 15
⅞, No. 21.....3 25
⅞, No. 22.....3 35
13-16, Nos. 13 to 18.....3 15
13-16, Nos. 16 to 18.....3 25
13-16, Nos. 19 and 20.....3 35
13-16, No. 21.....3 45
13-16, No. 22.....3 55
¾, Nos. 13 to 15.....3 45
¾, Nos. 16 to 18.....3 55
¾, Nos. 19 and 20.....3 65
¾, No. 21.....3 75
¾, No. 22.....3 85
11-16, Nos. 13 to 15.....3 45
11-16, Nos. 16 to 18.....3 55
11-16, Nos. 19 and 20.....3 65
11-16, No. 21.....3 75
11-16, No. 22.....3 85
⅝, Nos. 13 to 15.....3 25
⅝, Nos. 16 to 18.....3 75
⅝, Nos. 19 and 20.....3 95
⅝, No. 21.....4 05
⅝, No. 22.....4 15
⅝, No. 23.....4 25

Light Band

1¼ to 6 by ¼ to 3-16 in.....2 25
1¼ to 6 by Nos. 11 and 12.....2 35
1 to 1⅝ by ⅛ to 3-16 in.....2 35
1 to 1⅝ by Nos. 11 and 12.....2 45
⅞ and 13-16 by ⅛ to 3-16 in.....2 65
⅞ and 13-16 by Nos. 11 and 12.....2 75
¾ and 11-16 by ⅛ to 3-16 in.....2 95
¾ and 11-16 by Nos. 11 and 12.....3 05
⅝ and 9-16 by ⅛ to 3-16 in.....3 25
⅝ and 9-16 by Nos. 11 and 12.....3 30
½ by ⅛ to 3-16 in.....3 50
½ by Nos. 11 a d 12.....3 60

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12.....2 75
⅞ inch, " " " 13 and 14.....3 05
¾ inch, " " " 11 and 12 .....3 05
¾ inch " " " 13 and 14.....3 25

Sheet Iron.

No. 10 to 4.....2 50
No. 15 to 17.....2 70
No. 18 to 21.....2 90
No. 22 to 24.....2 90
No. 25 to 26.....3 00
No. 27.....3 10
No. 28 .....3 30

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 35
C No. 1, " 2 60
C H No. 1, " 2 85
C H Flange, " 3 55
Extra Flange, " 3 95
Solid Fire Box, " 4 85

Steel Boiler Plates—1-4 in. and heavier.

Tank $2 55
Shell $2 95
Flange.....$3 20
Marine Flange.....$3 70
Fire Box.....$4 35
Above includes plates 90 inches wide.
90 to 96 in. wide..... ½c. ₱ lb extra.
96 to 100 in. wide.....1 c. "
100 to 104 in. wide.....1½c. "
104 to 116 in. wide.....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ₱ lb
to 2 in. inclusive.....	09
9 16 to ½ in. "	09
7-16 to ⅝ and 2¼ to 3 in.....	10¼
3¼ to 4 in.....	11
⅝ to 11-16 an 4½.....	10¼

TRAVELER'S REGISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.— 'The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	7 30 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger		6 30 a m
Fostoria Passenger	5 06 p m	5 11 p m
Local Freight	1 00 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.
Euclid Accommodation departs 6:24 a. m. 5:06 p. m.
All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 50 p m	7 45 a m
New York Express	6 55 p m	1 35 p m
Alliance & Akron Accom.	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 p m
Akron, Col. & Zanesv'e Ex.	12 50 p m	1 35 p m
Akron & Orrville Accom.	9 35 a m	3 25 p m

The 8 p m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.

Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom.		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Cleveland and Canton Railroad.

Depart—
Canton and Coshocton—7:00 a.m., 3:15 p. m.
Bedford—7 00 a.m., 11:10 a. m., 2:00 p.m., 3:15 p.m., 4.40 p.m., *5:45 p.m., 10:35 p m.
Newburgh—6:12 a.m., 7:00 a.m., 11:10 a m., 2:00 p.m., 3:15 p m., 4:40 p.m., *5:45 p m., 7:00 p.m., 10:35 p.m.
Kent—7:30 a.m., 3:15 p.m., *5:45 p.m.
Arrive from—
Canton and Coshoctor—7:00 a.m., 6:55 p.m.
Bedford—6:00 a.m., *8:12 a.m., 9:50 a.m., 1:05 p.m., 5:05 p.m., 6:40 p m., 7:10 p.m.
Newburgh—6:00 a.m., *8:12 a.m., 9:50 a.m., 1:05 p.m., 5:05 p.m., 6:40 p.m., 7:10 p.m., 9:10 p.m.
Kent—*8:10 a m., 9:50 a. m., 6:55 p m.
Theatre train leaves Cleveland 10:35 p.m. and runs through to Newburgh and Bedford daily, except Sunday.
Trains marked with * run daily. All others daily except Sunday.
Depot at Ontario street, opposite Huron stree

Valley Railway.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail	*7 45 a m	*6 30 p m
Marietta Express	†11 15 a m	†2 30 p m
Valley Junction Express	* 4 15 p m	*10 15 a m
Cleve. & Canton Ex.	° 7 00 p m	†8 15 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Ag't.

Cleveland, Lorain and Wheeling.

All trains arrive and leave the Union Depot as follows:

	DEPART.	ARRIVE.
Wheeling Express	6 45 p m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

OSCAR TOWNSEND, Gen. Mang'r.

Cleveland & Marietta R. R.

In effect December 2, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 50 AM	2 00 AM	..Parkersburg...	2 45 PM	11 45 PM
11 50	6 45	.....Marietta.....	10 00 AM	7 03
12 53	7 50	.....Elba.....	8 56	5 59
1 00	7 57	...Macksburg...	8 49	5 52
1 07	8 04	..Dexter City...	8 42	5 45
1 11	8 09	..South Olive...	8 38	5 40
1 25	8 25	.....Caldwell.....	8 25	5 26
1 35	8 35	..Belle Valley...	8 0	5 16
1 56	8 56	..Pt. Pleasant...	7 47	4 54
2 0	9 08	.....Byesville.....	7 33	4 40
2 28	9 27	...Cambridge...	7 14	4 24
2 57	9 50	...Kimbolton...	6 47	3 57
3 15	10 13	N. Comerstown	6 25	3 35
3 57	10 55	...Canal Dover..	5 45 AM	2 53
4 17	11 17	ar. Vall'y J'n. lv		2 30
	.....	lv. Vall'y J'n. ar		.....
	12 15 PM	.....Canton.....		1 28
	1 15	..... Akron.....		12 30
	2 46	... Cleveland.....		11 15 AM
	8 15	.....Buffalo		5 40
11 15 PM	6 20	.....Toledo.....		7 45

Train No. 8 leaves Marietta at 3 00 p. m. Whipple 4 00, Warner 4 15, Elba 4 35, Macksburg 4 45, Dexter City 4 55, Caldwell 5 26, arriving Cambridge 7 00 p. m. Train No. 5 leaves Valley Junction at 4 50 p. m., arriving at Canal Dover 5 12 p m.
Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleviand, and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio ver Packets; at Cambridge with the B & O east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W. and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

A. T. WICKOFF, Gen. Manager. W. K. RICHARDS, Gen. Pass. Agt.

ERIE RAILWAY

THE FAVORITE AND Picturesque Route TO New York, Boston and the East.

The Shortest and Quickest Route to Pittsburgh Washington and Baltimore and the Southeast.

New Central Depot So. Water St. and Viaduct

	Depart.
No. 62, Accommodation	† 6 03 a m
No. 72, New York Express,	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast Pittsburgh Express,	* 3 00 p m
No. 66, Leavittsburgh Accommo.	* 4 00 p m
No. 68, Pittsburgh Express	†10 50 p m
No. 68, New York Express	†10 50 p m
No. 70, Pittsburgh Local Express	†11 45 a m
No. 74, Youngstown Express	† 4 20 p m
	Arrive.
No. 65, Fast New York Express	*12 50 a m
No. 61, Pittsburgh Express	* 7 35 a m
No. 67, Pittsburgh Express	†10 55 a m
No. 63, New York Express	* 6 55 p m
No. 63, Pittsburgh Express,	*6 55 p m
No. 69, Pittsburgh Local Express	† 9 10 p m
No. 13, Accommodation	† 5 25 p m

* Daily. † Daily, except Sunday.

☞This is the only route by which passengers can reach Corry, Elmira, Binghampton. New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Depot N. Y., P. & O. Railroad, South Water Street and Viaduct, Cleveland.

A. M. TUCKER, Gen. Sup't., Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cleveland, O.
M. L. FOUTS, City Passenger Agent. 141 Superior Street, Weddell House, Cleveland, O.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5: P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent, South Bethlehem, Pa.

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—
No. 1, Cleveland, Bradford and East, 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland 7 45 a.m
No. 5, Beaver Falls Accommodation 8 40 a.m
No. 7, Buffalo, New York, and all New England points, 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis, 1 10 p.m
No. 11, Buffalo Express 3 30 p.m
No. 13, Beaver Falls Accommodation 5 20 p.m
No. 15, Buffalo Express 10 30 p.m

Arrive from—
No. 2 Beaver Falls Accommodation 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. 6 55 a.m
No. 6, Youngstown Accommodation 9 20 a.m
No 8 Beaver Falls Accommodation 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis, 1 35 p.m
No. 12, Buffalo Express, 5 45 p.m
No. 14, Cincin., St. Louis and Cleveland, 8 05 p.m
No. 14, Cleveland & Buffalo Express 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
D. SMITH, Gen'l Pass. Ag't, Pittsburgh.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums time of expiration, etc., will be sent post-paid on receipt of $1 00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

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WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT NOV. 25, 1888
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 07	5 45	10 0
Fremont	9 06	2 33	6 10	.....
Clyde	9 22	2 49	6 25	.....
Bellevue	9 37	3 04	6 40	.....
Monroeville..lv	9 55	3 20	6 58	2 05 AM
Norwalk	10 10	3 40	7 17	2 17
Wellington	11 00	4 20	8 12	2 55
Creston	11 53	5 17	9 20	3 42
Orrville.....ar	12 20 PM	5 45	9 50 PM	4 10
Orrville.....lv	12 40	6 06	6 35 AM	6 35
Massillon.....ar	1 20	6 45	7 18	7 18
Massillon.....lv	1 20	6 45	7 18	7 18
Navarre	1 35	7 00	7 35	7 10
Valley Junc.lv.	2 20	7 35	8 20	8 20
NewCumberl'd	2 23	7 48	8 40	8 40
Sherrodsville	2 45	8 00	9 00	9 00
Leesville	2 52	8 08	9 20	9 20
Bowerston....ar	2 58 PM	8 15 PM	9 30 AM	9 30 AM
Canal Dover	3 53 PM	.....	.....	.....
New Comerst'n	3 5	.....	.....	.....
Cambridge	4 24	.....	.....	.....
Macksburg	5 52	.....	.....	.....
Marietta.....ar	7 03 PM	.....	.....	.....

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta.....lv	6 45 AM	11 50 AM	.....	.....
Macksburg	7 57	1 00 PM	.....	.....
Cambridge	9 27	2 28	.....	.....
New Comerst'n	10 13	3 15	.....	.....
Canal Dover	10 55 AM	3 57 PM	.....	.....
Bowerston	0 45 AM	3 50 PM	5 55 AM	.....
Leesville	10 52	3 57	6 02	.....
Sherrodsville	11 00	4 05	6 10	.....
New Cumberl'd	11 12	4 17	6 22	.....
Valley Junc	12 10 PM	4 35	6 45	.....
Navarre	12 45	5 10	7 35	.....
Massillon	1 05	5 25	8 00	.....
Orrville.....ar	1 40	6 05	8 58	.....
Orrville.....lv	1 45	6 35*	9 13	.....
Creston.....lv	2 18	7 04	9 42	.....
Wellington	3 05	7 43	10 33	.....
Norwalk	3 55	8 30	11 30	7 25 AM
Monroeville	4 07	8 49	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20	.....	12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar.. Huron ..Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	.....Milan	9 28	6 03
Lv 3 55	Lv 6 45	.....Norwalk.....	Ar 9 55	Ar 6 30
Ar 3 30	Ar AM		Lv 11 30	Lv 8 30
3 20 PM	.....	...Monroeville..	11 45 AM	8 40 AM

* Daily.

Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m

This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.
Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH.

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Havernill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland.....Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Havernill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 06 "	2 39 "	10 31 "
Columbus.....Ar	8 20 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.

JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio

Ft. Wayne, Cincinnati & Louisville RAILROAD.

THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH
TH DIRECT ROUTE TO OR FROM
FORT WAYNE,
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AND ST. LOUIS.

13 MILES SHORTER —BETWEEN— 13
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER AND QUICKER 22
By 3 HOURS, Between
Louisville and Fort Wayne.

Ask for Tickets
—VIA—
Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines, EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

WEST'S

MOULDERS' TEXT-BOOK:

AMERICAN FOUNDRY PRACTICE.

BEING PART II OF

Presenting best methods and original rules for obtaining good, sound, clean castings, and giving detailed description for making moulds requiring skill and experience.

Also containing a practical treatise upon the construction of cranes and cupolas, and the melting of iron and scrap steel in iron foundries. By

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Practical iron moulder and foundry foreman member of the American Society of Mechanical Engineers and of the Civil Engineers' Club of Cleveland, Ohio.

12mo. Cloth, $2,50

Fully illustrated and with complete index Will be mailed, prepaid, on receipt of the price.

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CLEVELAND PRINTING AND PUB. CO

CLEVELAND, OHIO.

½ to 6 in.	11½
½ to 9-32 and 6⅛ to 7 in.	12
3-6 in.	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	02¾
Tire "	02¾
Spring "	03¼
Sleigh Shoe "	02¾
Toe Calk "	03
Cutter Shoes, tapered and burr "	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3½ to 4 "	0.3
4½ to 6 "	1.0
⅝ to 15 16 "	0.2
½ to 11-16 "	0.3
⅜ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7
Machine cutting, specified lengths, ab'e 24 in.	0.2
Machine cutting, specified lengths, 12 to 24 in.	0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS. cts. per lb ex.

1½ to 6 in., by 5-16 to 1 in. thick	base
1½ to 6 in., by ¼ and 9 32 in. thick	0.2
1½ to 6 in., by 3-16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in. thick	0.4
¾ to 1 7-19 in., by ¼ to 1 in. thick	0.3
⅜ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
¾ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
⅝ to 11-16 in., by ¼ to ½ in. thick	0.4
⅝ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅝ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅞ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1½ in., by 1.16 and 3-32 in. thick	1.5
1½ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS. cts. ex.

1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1½ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅞ to 3 in. by No. 8 gauge to 10 gauge "	1.0
¾ to 3 in. by No. 11 gauge to 16 gauge "	2.0
¾ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅝ to ⅞ in. by No. 10 gauge to 16 gauge "	4.0
⅝ to ⅞ in. by No. 17 gauge to 20 gauge "	5.0
⅝ to ⅞ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 inch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL. cts. ex

⅜ to 1½ inches	base
¼ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

¼, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ¼, ⅜, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2½c
Pipe mill castings	3 c
Rolling mill castings under 50 lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3½c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails gross tons	$27 00
Old steel rails	23 00
Car wheels	20 00
Old copper per lb	7
No. 1. H. red Brass	8¼
Heavy yellow brass	6½
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	52½
XX str	52½
Wrought iron pipe. Lap black X str	52½
XX str	52½
Wrought iron pipe: Butt galv	45
" " Lap "	52½
Lap-welded boiler tubes	55
" drive pipe	
" casing	
Lead pipe per lb	1¼
Sheet lead "	5¾
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	67½
" flange unions	75
Long screws	70
Gas pipe hooks	50
Cast iron flanges	70
Man folds and expansion pipe hangers	67½
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves, expansion joints	70
Iron cocks	60
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	65
Throttle and butterfly valves	55
Brass: Fin. globe valves, with finished brass wheels	45
Brass: Steam, service, meter and union meter cocks	60
Brass: Expansion joints and steam bibbs	55
Mississippi gauge cocks	55
Bingham "	
Gas proving pumps	
Oil cups, lubricators and air cocks	65
Cocks for steam gauges	65
Cylinder cocks	55
Comp. gauge cocks	60
Water gauges, steam whistles and whistle valves	65
Gas fixture fittings	50
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65&5
Galvanized wrought iron range boilers, larger	60&10
Stands for same	40
Copper bath tubs	30
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Plain, tray and bath bibbs, stops, shower stops, hydrant and ball cocks—rough	60
Finished, do	55
Compression:	
Rough and fin. plain, tray and bath bibbs	60
" " stops; urinal, hopper, hydrant and ball cocks	60
Basin cocks, from No. 1 to 13 inclusive	60
" " double basin	45
Shampooing and sink cocks	45
Pantry cocks	55
Shampooing sprinklers	60
Double bath cocks and chain stays	60
Hose goods, plain and water back couplings	60
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60
Soldering nipples	70
Soldering unions	65
Union joints	65
End ferrules	70
Street washer screws, checks and guides	60
Hydrant and basin clamps, hydrant sockets	60
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" " Plain	50
" " Jarecki	50
" " Robbins' chain	10
" " Brock's	10
Vises: Plain pipe	50
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	35
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09⅓	0 12⅓	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
14	9 00		.375	58 00	8	
15	10 00		.375	62 00	8	

Extra Strong, double above list.
Double and strong 4 times above list.

Double Extra Strong, double list of Extra Strong.

LAP-WELDED BOILER TUBES.

Size, Outside Diameter, inches	1	1¼	1½	1¾	2	2¼	2½	3	3¼	3½
Price per foot	23	23	23	24	22	28	28	34	38	43
Price, Lap-Welded Drive Pipe	8	10	12		15		22	30	40	45

DRIVE PIPE SHOES.

	6"	8"	10"	12"
Long, Separate	13 00	15 00	20 00	25 00
" Shrunk on pipe	16 00	18 00	25 00	30 00
Short, Separate	12 00	14 00	17 00	22 00
" Screwed on pipe	13 00	15 00	19 00	24 00

DRIVE PIPE HEADS.

	12 00	15 00	18 00	22 00

LAP-WELDED CASING.

Size, Inside Diameter Nominal	2	2¼	2½	3	3¼	3½	4	4¼	4½	5	5 3-16	6	7	8	9	10	11	12
Price, per foot	25	28	31	34	38	43	45	52	56	61	66	72	79	86	1 00	1 30	1 85	2 10
Tarred or Asphalt and Kalamein Pipe, list and discount furnished on application.																		

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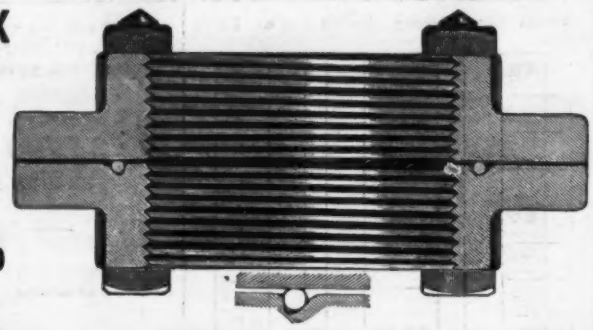

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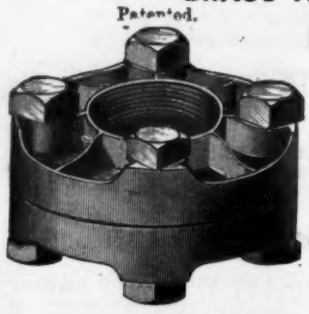

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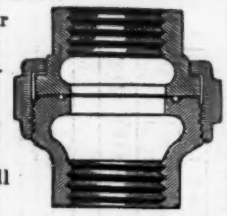

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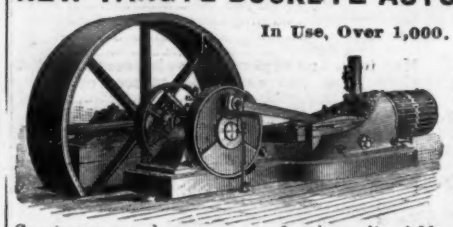

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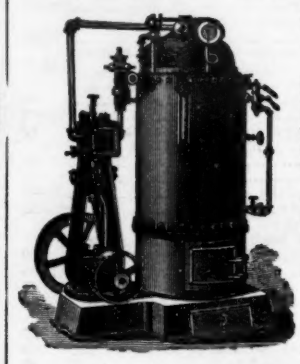

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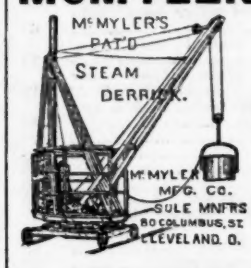

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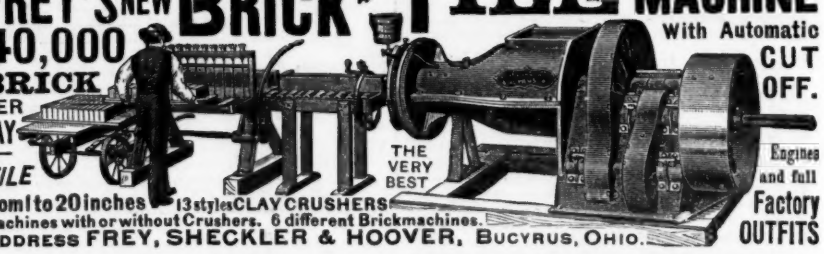

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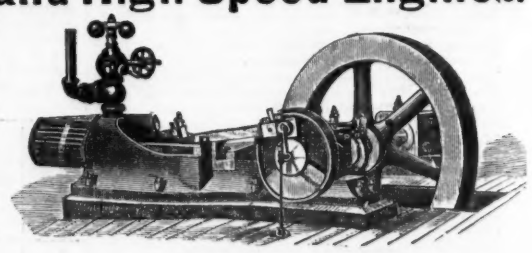

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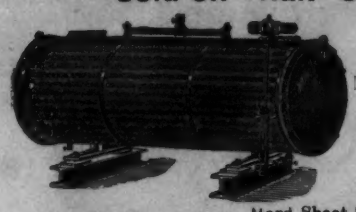

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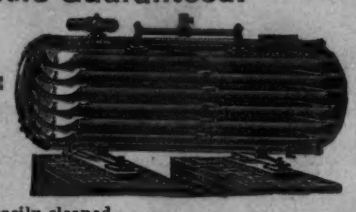

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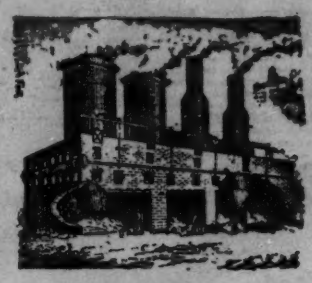

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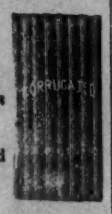

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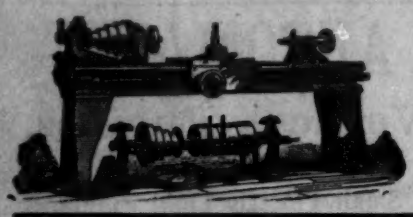

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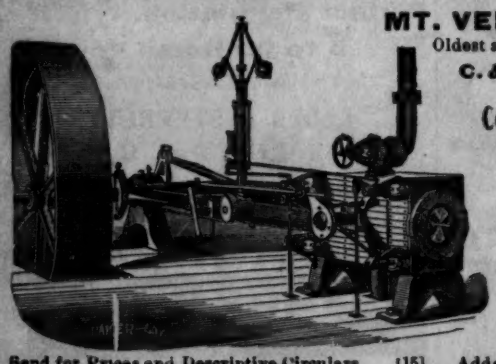

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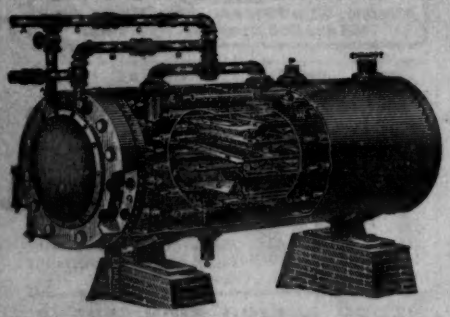

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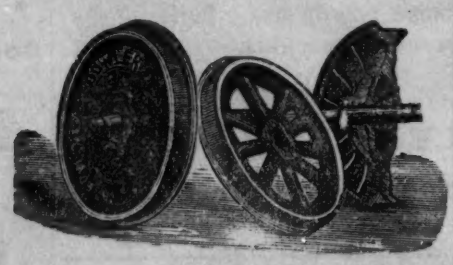

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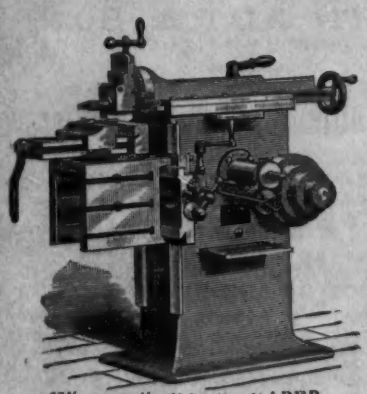

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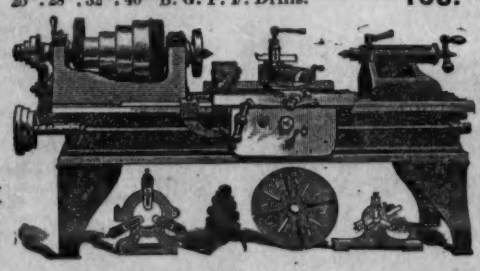

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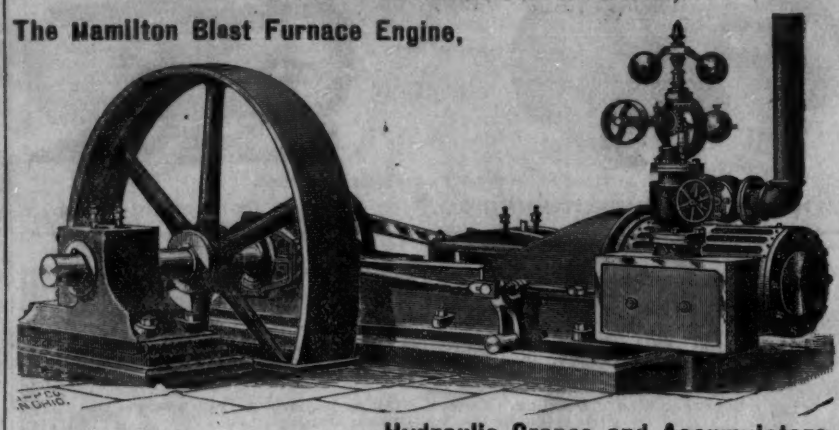

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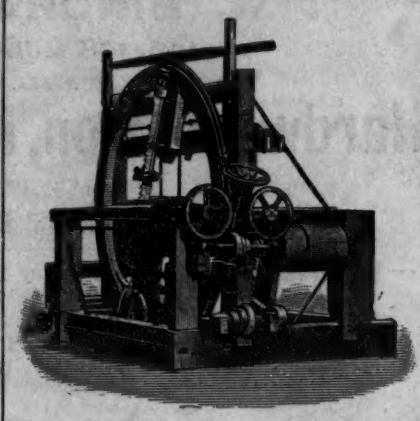

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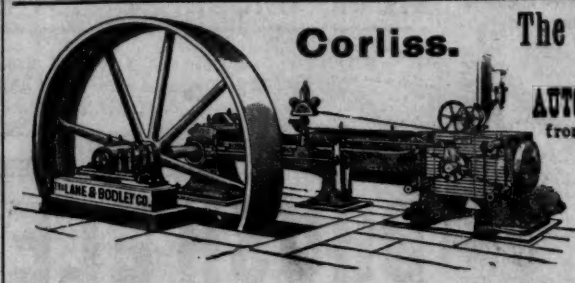

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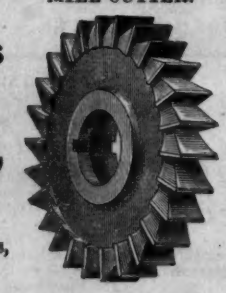

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